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Editorials.

THE PROPOSED NEW BILL.

AT the January meeting of the Council of the Royal College of Veterinary Surgeons the proposed new Bill was again discussed at some length, and some very important amendments were adopted. Certainly the most important one was the deletion of the "penal clause" for non-payment of the annual fee by which the defaulter's name would have been omitted from the Register until he paid his fee. That seemed to us to be a very simple and effective method of ensuring payment, though undoubtedly the punishment was to be far in excess of the crime, since the defaulter would have been in a similar position to the man guilty of some misdemeanour for which he was struck off the rolls. This afforded the opponents to the Bill a very strong argument with which to appeal to members of the profession. As a result of the agitation, however, and in order to appease those gentlemen who thought a great injustice might be done, a method of collecting the fee suggested originally by themselves has been adopted, and we sincerely hope they will meet the compromise with a fair spirit, and assist in pressing the Bill forward. We welcome the change if it has that effect. According to this recommendation, the annual fee, if unpaid after due notice, will become a debt payable to the Royal College of Veterinary Surgeons, "and may be sued for and recovered in the County Court having jurisdiction over the district in which the head office of the College may for the time being be situate. . . . Provided always that the Council shall have power to withhold such proceedings for the recovery of the said fee in cases in which, in the opinion of the Council, the member is unable to pay."

From the above it will be seen that, far from wishing to act in any arbitrary and harsh manner, the Council are desirous of being as lenient as possible consistent with the merits of individual cases. No doubt jurisdiction is to be asked for this particular County Court, in order to facilitate action and allow of a number of cases being taken practically at the same time, if necessity should unfortunately arise. We are inclined to think, however, that if the case were to be taken in the district where the defaulter lived or practised it would be more effective in preventing his becoming a defaulter. The local publicity of such an action would do far more than a guinea's worth of damage to the practitioner's reputation, and he would see that it did not happen. Personally, we would prefer to have our names quietly deleted from the Register than to have such unwelcome advertisement.

Another important cause of opposition in many quarters is the inability to see the necessity for so large a sum of money annually as that which would be brought by the payment of a guinea a year by the members practising in the United Kingdom. Such a sum has been estimated at about £3,000. That is certainly a large sum, and many members think it unnecessarily large, though at once admitting the necessity for obtaining some addition to the present channels of income. Accordingly, they suggest a sliding scale, the precise fee to be fixed annually. The amendment proposed at the Council meeting embodied the words: "Such a fee not exceeding a sum of one guinea, as the Council shall from time to time fix." The majority of the Council, however, did not see fit to adopt the amendment, pointing out that it would lead to endless controversy at Council elections as to what was to be the amount of the annual fee.

We would suggest that here is a very excellent opportunity for a good workable compromise, and we hope some member of Council will take it up at the next meeting. Our suggestion is that the Bill should provide for the imposition of an annual fee of a guinea or half a guinea, to be fixed by the Council every five years. In this way the first fee should be a guinea, payable each year for five years. That will give plenty of time to form an opinion as to whether or not it is more than necessary. If it is more than necessary, then the fee for the next five years can be

reduced to half a guinea, to be raised again later if necessity arose, or to be retained if found to be sufficient.

THE TREATMENT OF WOUNDS.

We commend to our readers a careful perusal of the rather full abstract of Sir W. Watson Cheyne's lecture on the above subject delivered before the Royal College of Surgeons. It is the most carefully thought-out and thorough discourse on this important subject that we have been treated to for a very long time, and no practitioner of veterinary surgery can read it without deriving considerable benefit from it. In fact, it seems to be peculiarly applicable to veterinary surgery, since the lecturer draws special attention to the extremes in common practice to-day, viz., the use of too potent antiseptics by one class and the rigorous exclusion of chemical antiseptics by another class. The latter system—the modern so-called aseptic surgery—is obviously impracticable in veterinary practice, owing to the conditions under which operations have to be performed and the great difficulty in obtaining control and protection against possible infection of wounds after operations. The latter circumstance alone necessitates that all protective dressings shall contain some suitable antiseptic. The dressings are quite certain to become soiled, and, unless prevented by antiseptics, organisms readily propagate through and reach the surface of the wounds. Sir W. Watson Cheyne has pointed out that, with all the modern hospital equipment, it is almost impossible to guard against a few organisms contaminating operation wounds. If that is so, then it is certainly a forlorn hope for veterinary surgeons to imagine they can manage it. These points, however, serve admirably to emphasize the main principles to which the lecturer wished to draw attention, viz., that antiseptics are always advisable, and that they must be used with discretion. If the latter point is neglected and they are used too strong, then obviously the vitality of the tissues must be impaired, the natural power of resistance is diminished, and the process of repair and healing of the wound are impeded.

The lecture, however, is so full and lucid that we can add nothing to it, and the purpose of this note is mainly to direct special attention to it.

General Articles.

DISEASES OF ANIMALS ACTS, 1894 TO 1903.

SUMMARY OF RETURNS OF OUTBREAKS OF DISEASES IN GREAT BRITAIN.

Period		Anthrax		Foot-and-Mouth Disease		Glanders (including Farcy)		Sheep-Scab	Swine-Fever	
		Outbreaks	Animals attacked	Outbreaks	Animals attacked	Outbreaks	Animals attacked	Outbreaks	Outbreaks	Swine slaughtered as diseased or exposed to infection
Total for 52 weeks, 1908*		1,108	1,426	3	112	785	2,421	849	2,067	14,096
Corresponding period in	1907 ...	1,084	1,456	...	...	854	1,921	751	2,336	11,275
	1906 ...	939	1,330	...	...	1,066	2,012	534	1,280	7,359
	1905 ...	970	1,317	...	...	1,214	2,068	918	817	3,876

* The figures for 1908 are approximate only.

SUMMARY OF RETURNS OF OUTBREAKS OF DISEASES IN IRELAND.

Period		Anthrax		Epizootic Lymphangitis		Glanders (including Farcy)		Sheep-Scab	Swine-Fever	
		Outbreaks	Animals attacked	Outbreaks	Animals attacked	Outbreaks	Animals attacked	Outbreaks	Outbreaks	Swine slaughtered as diseased or exposed to infection
Total for 52 weeks, 1908*		8	11	—	—	—	—	384	159	3,625
Corresponding period in	1907 ...	3	5	—	—	6	11	326	161	2,789
	1906 ...	4	8	1	1	8	16	254	95	1,103
	1905 ..	4	6	10	25	31	107	339	137	1,416

* The figures for 1908 are approximate only.

THE TREATMENT OF WOUNDS.[1]

BY SIR W. WATSON CHEYNE, BART., C.B., F.R.S., M.B., C.M.EDIN., F.R.C.S.ENG., SENIOR SURGEON TO KING'S COLLEGE HOSPITAL, &C.

WHAT first put Lister on the track of his epoch-marking work was the consideration of the behaviour of a subcutaneous wound as compared with an open one, and his aim from the very first was to place an open wound, as far as possible, under the same conditions as a

[1] Being the Bradshaw Lecture delivered before the Royal College of Surgeons of England on December 4, 1908.

subcutaneous one. In the open wound two sets of noxious agencies come into play. In the first place, it is exposed to a variety of mechanical and chemical irritations from the dressings, air, &c., and in the second place to the entrance of infective agents. The surface of the wound, for instance, comes in contact with dressings, and is mechanically irritated by movement, &c. And in the attempts to get a wound to heal it may also be irritated by various chemical substances intentionally applied to it, with the result that instead of healing rapidly the tissues are kept in a constant state of irritation, exudation goes on, and cells accumulate in the part, the original tissue at the surface is destroyed, and its place is taken by granulation tissue. It is true that if irritation of this kind is but slight healing will nevertheless take place rapidly, but if it be excessive it may be markedly delayed or actually prevented.

Even where an open wound is stitched up, and thus, as far as these mechanical and chemical causes of irritation are concerned, is converted into a subcutaneous one, very serious troubles, much more grave than those alluded to above, may arise, due to the entrance of various forms of bacteria into the wound and their growth either in the discharges present in it or in the tissues themselves. It is in reality to these organisms rather than to the other agencies to which I have referred above that the essential troubles in connection with open wounds are due. Apart from the growth of bacteria, it would be quite easy to minimize the other sources of irritation, so that little, if any, delay in healing should result, and in the absence of micro-organisms none of the serious troubles which affect the health or life of the patient or of the part, and which so often used to follow open wounds, would arise. These troubles are practically entirely due to bacterial infection, which occurs as soon as the skin is broken or so injured that it is deprived of its vitality, and the essence of the problem of the treatment of wounds is how to avoid such infection. It was this problem that Lister attacked, and though the main principle on which he proceeded from the first was to prevent, as far as possible, the entrance of bacteria into wounds, he laid much stress on the avoidance of undue irritation of the latter in the process. In fact, his ideal was so to alter the conditions in an external wound as to approach as closely as possible to those in a subcutaneous one. The question for review, then, is how far this ideal is or can be attained, and what are the best methods to adopt for this purpose.

(1) In the first place, let us consider the question of the exclusion of bacteria from wounds. Lister began by trying to kill the bacteria before or when they came in contact with the wounds, and for this purpose he had recourse to the use of various chemical substances belonging to the class now known as antiseptics. In his earliest work, which had to do with compound fractures, the wounds being already soiled and infected, the method he adopted was to apply undiluted carbolic acid to the wound, with the view of destroying the organisms which had already entered it before the patient came under the notice of the surgeon, and then, in order to prevent the access of fresh bacteria, he made a paste with the blood contained in the wound and the undiluted carbolic acid, which must have effectually prevented the further entrance and growth of micro-organisms. This original plan was very soon modified, and the constant efforts which he made to improve his

methods in the direction of less irritation of the wounds, with, at the same time, efficient exclusion of bacteria, will be found detailed in his collected papers.

When I became house surgeon to Lord Lister in Edinburgh in 1876, it occurred to me to test the discharges of the wounds which were under his treatment, to see how far the desired result—viz., the exclusion of bacteria—was really attained. At that time it was easy to examine this matter very thoroughly, because in the case of practically every operation a drainage-tube was inserted, and was retained for from four to eight days, and as long as the tube was present the dressing was changed daily. At that time the modern methods of staining bacteria had not been introduced, and I had, therefore, to devise methods of cultivation in various fluid media. These methods need not be detailed here, but the results so obtained were very definite, and entirely coincided with those got in after-years by simpler and better methods of cultivation, and also by suitable staining of the discharge. The results practically came to this, that, as a rule, in wounds treated by Lister's methods no organisms were found in material taken from the interior of the drainage-tube during the first few days, but that afterwards one began to find micrococci in a certain proportion of the cases, especially if the dressing had been left unchanged for more than twenty-four hours, or if old epithelium had been allowed to accumulate under the dressing. Suppuration, however, did not necessarily occur, even when these organisms were present. I therefore assumed that they were innocuous organisms, either of a special kind or else the common pyogenic organisms deprived of their infective power by the antiseptics employed. I also came to the conclusion that they spread into the wound under the carbolic gauze dressing by growing in the epithelium, for I found that they were present in the old epithelium, at some distance from the edge of the wound, in larger numbers and at an earlier period than in the wound itself. It was thus evident that bacteria either did not get into the wounds at the time of the operation, or, if they entered, they found themselves under such conditions that they were unable to grow, but that at a later period of the case they might spread in, presumably under the protection of the superficial layers of the epithelium, even though the part was covered by a carbolic gauze dressing. After the drainage of wounds was to a large extent given up, it was not so easy to test this matter thoroughly, because when the first dressing was changed, usually after a week, the wound had healed. If, however, for the purpose of investigation, one dresses such wounds early, one obtains a negative result as regards the presence of bacteria in their interior. Further, in cases where, as the result of leaving too large a cavity, or from some other cause, serum accumulates in the wound, one may find on evacuating it even after a week or more that it does not contain organisms. As a practical fact, therefore, we may take it that organisms do not grow in wounds treated by strict Listerian precautions.

But can we say that living bacteria do not gain access to wounds at the time of the operation, and are not present there in a living state when the wound is closed? It is quite probable that in the earlier methods of treatment, such as the application of undiluted carbolic acid, the bacteria were all destroyed, and no living organisms were left in the wound. But that can hardly be the case in the later developments

of the Listerian method, especially in the plan which is so much the fashion now—namely, the so-called aseptic method. No doubt the entrance of living organisms during the operation from external objects such as the skin, the instruments, the ligatures, &c., can be prevented, but their entrance from the air cannot. We know that air in a state of motion is full of dust, and if we expose plates covered with nutrient jelly to such air we find that various spots of growth appear on the surface, their number and the character of the organisms which compose them varying according to the length of time the plates are exposed, to the place where the exposure is made, and to the moisture of the atmosphere. Why, then, are these organisms not found in the discharge contained in the wound after twenty-four hours?

This raises a very wide question. If organisms do not, as a rule, grow in a wound when the only loophole for their entrance is the air, why is it that they so constantly grow in wounds when no antiseptic precautions have been taken and where other loopholes have therefore been left open? This depends, in the first place, on the kind of organism which enters. If plates covered with nutrient jelly are exposed in an ordinary dry atmosphere, the great majority of organisms which develop are moulds or various kinds of bacilli. As a matter of fact, the chief living contents of the dust of the air are spore-bearing organisms, for non-spore-bearing organisms, such as the micrococci, cannot withstand drying, and soon lose their vitality when deprived of moisture. We may therefore assume that the fungi and bacilli which are ordinarily present in the atmospheric dust are unable to grow in the living tissues of man; in other words, are not pathogenic in man, at any rate under the conditions present in a wound treated by strict Listerian methods.

The chief habitat of the pyogenic cocci, so far as infection of wounds is concerned, is the skin of the patient or the operator, or discharges from wounds which may be present in the neighbourhood of the seat of operation. Where, therefore, the skin of the patient and the hands of the operator are thoroughly disinfected, and where precautions are taken which prevent further contamination, the probabilities are that there are many wounds into which no pyogenic cocci have entered, and where the only organisms which fall in are non-pathogenic to man. Nevertheless, one does find cocci closely related to the pyogenic ones, and sometimes actually belonging to that class, in atmospheric dust, especially where the air is moist, and in a prolonged operation it is highly probable that organisms of that class also fall into the wounds, and yet they do not grow. Hence we must consider the other possibilities.

Early in the development of bacteriology it was shown that pathogenic power was a property which varied very markedly, and which could be impared by a variety of comparatively slight causes; among others, the use of various antiseptic substances in a dilution short of that required to kill micro-organisms was found to diminish their pathogenic activity. For example, among the various ways in which the virulence of the anthrax bacillus can be diminished or "attenuated," as the French expression is, one is the action of weak solutions of carbolic acid on the organisms for varying periods of time. Hence, when, as already stated, I found micrococci in the discharges from wounds which were following an aseptic course, in the old days of carbolic

gauze and the freer use of carbolic lotions, I thought that the explanation might be that the virulence of the organisms had been diminished by the action of the carbolic acid, and the same may have been the case with cocci coming from the air in the old days of the carbolic spray. This, however, though a plausible explanation, did not seem to me, on more careful consideration, to be altogether sufficient to explain the facts.

On thinking further over these matters, it occurred to me to enquire whether the number of bacteria which entered the body at any one time was of importance, and whether this might explain the improved results of those who had not fully adopted the Listerian treatment, but who, nevertheless, tried to be as cleanly as possible—that is to say, who introduced as few bacteria as possible into their wounds. The fact already demonstrated by Lister that, in order to produce putrefaction in blood-clot in glass vessels, it was necessary to add a definite, though small, quantity of putrid material, and the statement that good results were obtained by simply washing the hands and skin with soap-and-water, in operations on the peritoneum especially, seemed to make it worth while to try a few experiments on the subject. The result showed that the number of bacteria which initiate the disease is in certain cases of paramount importance, and this has now become one of the fundamental bacteriological facts. In only very few cases was a single bacterium able to start disease; in most instances several were necessary, while in some large numbers were required. As regards the pyogenic organisms in man, I came to the conclusion that man was not a particularly susceptible subject for the growth of these organisms, and that, therefore, a considerable number were required to produce a pathogenic effect.

Thus we have three reasons why wounds treated on Listerian principles are found to be free from organisms, even although it is certain that organisms of some kind or other do enter during the operation. (*a*) No pathogenic organisms are admitted at the time of the operation; this is probably so in most instances. (*b*) If pathogenic organisms do enter they may be so few in number that they cannot obtain a footing. (*c*) The pathogenic organisms which enter may have such slight virulence, either naturally or acquired as the result of the action of the antiseptics with which they come in contact, that they cannot overcome the resisting power of the body. As a matter of fact, the organisms which usually enter during a carefully performed Listerian operation are either non-pathogenic bacilli or the ordinary micrococcus epidermidis, which has only very slight, if any, pathogenic power.

(2) Let us now refer, in the second place, to the effect on the tissues of the methods employed to prevent bacteric infection. In the treatment of wounds we must not concentrate our whole attention on the exclusion of bacteria. We must also avoid irritation of the tissues exposed in the wound as far as possible. I have already referred to this matter, and to the results which may follow as regards the healing of wounds from too great irritation. The question here is how far the measures necessary to prevent bacteric infection do or need interfere with healing. In the earlier development of the treatment, no doubt, wounds were considerably irritated by the antiseptics employed, and though that did not go so far as to interfere seriously with healing it

led to excessive effusion of serum, and necessitated the constant use of drainage-tubes, and therefore frequent changes of dressings. Since, however, the carbolic spray has been given up, drainage-tubes have been found to be unnecessary, unless in exceptional cases. As a matter of fact, as we have managed matters of late years, no carbolic acid comes in contact with the wounds, and the few drops of sublimate solution which may get in on the fingers, &c., are at once precipitated by the blood and rendered inert.

Apart from interference with healing, excessive irritation of a wound has another bad effect, in that it diminishes the resisting power of the tissues, and thereby may enable organisms to take root which otherwise would have been unable to do so. At first sight, in accordance with recent views on the importance of the serum in connection with resisting power, one might think that an increased flow of serum as the result of the irritation of the wound would be a good thing, but in my opinion the important seat of the resisting power of the body is in the tissues. In the Wightman lecture delivered last May I discussed the defensive arrangements of the body, and showed that they resided in the main in the tissues, and that an extremely important point in connection with the subject was the local differences in the resisting power. I instanced, for example, the different behaviour of the tubercle bacillus in the various bones and joints of the body, and similar differences exist in the case of the pyogenic organisms, according to the part of the body into which they are introduced. Thus we know that if pyogenic organisms enter joints, or bursæ, or lymph spaces they produce much more violent effects than if they are introduced into the peritoneal cavity or into the subcutaneous areolar tissue.

That the living tissues have the power in some way or other of disposing of bacteria was quite early recognized by Lister. He frequently referred to this point in his lectures, and showed specimens of urine free from growth which had been obtained simply by cleansing the orifice of the urethra, and then passing the urine into sterilized flasks with precautions against the entrance of dust, thus proving that bacteria could not spread along a healthy urethra. He also pointed out the influence of the tissues in preventing the growth of bacteria, as exemplified by the results of operations performed in situations where bacteria cannot be excluded. For example, in operations for hare-lip and cleft palate union by first intention is the rule, provided the tissues are not handled roughly, even though the wounds are bathed with saliva containing large numbers of bacteria.

Now when we have said above that non-pathogenic bacilli, or only slightly virulent cocci, or only cocci in small numbers, may get into wounds made under Listerian precautions, but under these conditions cannot grow, this failure to grow must clearly be due to the action of the living tissues, for under any of these circumstances growth would occur if the tissues were dead; while the tissues are alive, therefore, they have the power of opposing the growth of bacteria, and actually destroy them under favourable conditions.

This action of the tissues in destroying bacteria can be seriously interfered with in various ways in the course of an operation, such as by severe handling and bruising, by the excessive use of antiseptics, or even by washing the wound with plain water, which causes the cells to swell up and lose their vitality, and which is about the worst

thing that one can introduce into a wound from this point of view. If, under any of these circumstances, scrupulous care be not taken to prevent the entrance of pathogenic bacteria into a wound, and if they do enter in any considerable numbers, they can grow more readily and produce more violent effects than in wounds which have been more carefully treated. The experience of years, however, shows that the minute traces of antiseptics which may get into wounds during a properly performed Listerian operation have no appreciable effect in retarding the healing of the wound or in interfering with the resisting power of the tissues.

As a result of the foregoing considerations we see that there are two great points to be kept in mind in treating wounds—namely, (*a*) the exclusion of bacteria, especially of pathogenic organisms, as far as possible during and after an operation; and (*b*) avoidance of irritation of the surface of the wound, so as not to interfere with healing, nor with the power of the tissues in preventing the growth of any bacteria which may have entered. These are the two essential principles which Lister laid down, and which his immediate pupils have tried to follow. It is interesting indeed to see how Lister, beginning by making the exclusion of bacteria from wounds his main aim, and having apparently attained this object, devoted increased attention to the avoidance of irritation of the wounds by the means employed to keep out the bacteria. In fact, in the later period of his work his main efforts were directed to the search, not for more efficient antiseptics, but for equally efficient antiseptics, which would be as little irritating as possible to the wound. It is always the tendency, however, of pupils to out-Herod their masters, and thus many of those who took up Listerian treatment went to the extreme of deluging their wounds with carbolic acid, and disregarded Lister's second postulate; they thus became well acquainted with the poisonous and irregular action of the antiseptics employed, while at the same time they did not always succeed in avoiding infection. Indeed many, thinking that everything necessary was done if only carbolic acid were employed, forgot the most elementary precautions, especially the cleansing of the hands and the avoidance of reinfection of the hands during the operation. And the result was that sepsis occurred, and was often, indeed, more severe than if no antiseptic had been employed, owing to the diminution of the resisting power of the tissues as the result of the irritation of the antiseptic. Curiously enough, many men at the present day who have not been intimately acquainted with Lister's own work think that that was Lister's treatment, and that there is, therefore, some fundamental antagonism between the Listerian principles and the so-called aseptic treatment of the present day. From this extreme travesty of Listerian treatment the pendulum has swung completely round to the other extreme, and the surgeon's efforts have of late been largely directed to avoiding the contact of antiseptic chemical agents with wounds, and to injuring the tissues in that way as little as possible. In fact, in the hands of the extremists this point has been carried as far beyond the mean as the abuse of antiseptics was in former times.

As far as I can judge, what led to this swing of the pendulum was, firstly, the excessive use of antiseptics with unsatisfactory results of which I have just spoken; secondly, the constant statements as to

satisfactory results obtained by ordinary cleanliness; thirdly, the slow action of antiseptics in destroying spores and their consequent inefficiency under certain conditions; fourthly, various statements as to the difficulty of disinfecting the skin—that is to say, of entirely eradicating the bacteria—which have led many to look on it as a hopeless task; and fifthly, an exaggerated belief in the resisting power of the body.

The first of these points I have just referred to. As regards the second, the opposition to the strict Listerian treatment arose in the first instance and chiefly from surgeons whose operative work dealt essentially with the peritoneal cavity. When, however, these surgeons had to operate on the tissues in other parts of the body they encountered a discouraging amount of suppuration. This is explained by the difference in resisting power in different tissues; evidently the peritoneum has a special power of dealing with bacteria when they are not present in too great numbers or in too virulent a condition.

As to the third point, doubt has arisen as to the efficacy of chemical antiseptics in destroying bacteria, and this is probably a reaction from the idea that antiseptics are instantaneous in their action, which was, of course, the only justification of the use of the spray. Koch was the first to test this matter definitely, and the chief point brought out by his researches was the great difference in the resisting power of actively growing bacteria on the one hand and of spores on the other. In the case of the former, if the antiseptic solution can obtain free access to the organisms, it is only a matter of seconds, or at most of a very few minutes, before they are completely destroyed, provided the solution is sufficiently strong. In the case of spores, on the other hand, the time is much longer, but in any case 1 in 20 carbolic lotion kills them in twenty-four hours. Where bacteria are surrounded by albuminous material the antiseptic coagulates the albumin, and this coagulum may prevent the penetration of the antiseptics, especially of the mercurial preparations, and thus protect the bacteria in the interior for a long time. Carbolic acid, however, can penetrate this coagulum, and even under these circumstances will, as a rule, lead to complete destruction of the bacteria and their spores in twenty-four hours. It is well to recall these facts, for the extremists seem to forget that antiseptics can do what is asked of them, and that heat is not the only way of destroying bacteria. It is not really necessary to try to devise elaborate methods of sterilizing materials such as catgut by heat, or to discard the use of valuable articles such as marine sponges because they are spoilt by boiling. Immersion in suitable antiseptic solutions for the appropriate length of time will be thoroughly effectual in these cases.

As regards the fourth point, I believe that the extreme aseptic views have sprung up to a large extent from the statement that it is practically impossible to disinfect the skin. I confess that these statements puzzle me very much, bearing in mind the uniformly aseptic results which we have for years obtained without the use of gloves—results which have not and cannot be improved upon. In the absence of organisms from our wounds and the aseptic course they pursue, it is difficult to believe that the skin has not been thoroughly disinfected. Much depends on the methods of disinfection employed. I believe it is essential to employ carbolic acid for the disinfection of the skin.

It mixes with a fatty material and penetrates through the epithelium in a way that no other antiseptic does. Mercurial solutions are very inefficient, as they do not mix with fatty material, and thus do not penetrate the epidermis. Even after washing the skin thoroughly with ethereal soap the mercurial solution collects in drops like water on a duck's back, while carbolic lotion wets the skin uniformly. In many of the experiments mercurial preparations have apparently been the antiseptic employed.

Fifthly, these views as to the inefficiency and harmful action of antiseptics have coincided with an increased belief in the resisting power of the tissues to bacteric invasion, and in the minds of some it has seemed of even greater importance to try to keep up or to increase the resisting power of the tissues than to destroy the bacteria. The importance of this point was early realized by Lister, and has not been lost sight of, and there is no doubt that every care must be taken to interfere as little as possible with these protective agencies. It is, however, really a question of relative importance, and I believe that where we have to do with an operation through unbroken skin the most important point is to prevent the entrance of bacteria. Experience amply shows that this can be done as far as is necessary without materially damaging the resisting power of the part. On the other hand, where the operation is performed in regions such as the mouth, where bacteria are present and cannot be excluded, while fresh contamination should of course be avoided, the chief reliance must be placed on the resisting power of the tissues, and everything which may to any extent diminish that must be avoided. At the present time the subject of resisting power is still in the stage of development, and in any case ample clinical experience has shown us that we must not place too great reliance on this factor.

Let us now see how far the methods of wound treatment at present adopted meet the requirements of the case. Of late many surgeons have gone to extremes in the avoidance of antiseptic solutions, and speak of the plan they use as "aseptic surgery." This term "aseptic surgery" is, in my opinion, not a good one. It is looked on by some as implying a different principle from the Listerian one, but, of course, that is not the case. It is only carrying to an extreme the principle of avoiding irritation of wounds, and giving Lister's second postulate a position of undue prominence. It is fortunately only a few surgeons who misread the facts to such an extent as to give up any attempt at excluding bacteria, and depend upon what is popularly known as cleanliness. These use water boiled or unboiled, sometimes not even adding chloride of sodium to it, and are thus under the happy delusion that they are using materials which will not interfere with the normal resisting mechanism of the body. But so far as that mechanism depends on the integrity of leucocytes and other cells in the wound they might as well, or even better, use antiseptics; for one has only to watch the behaviour of these cells under the microscope, on the addition of plain water, to see how rapidly they swell up and become completely disintegrated. I used the term "aseptic surgery" many years ago to indicate Listerism, with the meaning that the wound was kept aseptic, as opposed to "antiseptic surgery," where attempts were made to eradicate sepsis from wounds already infected. At the present time "aseptic surgery" is used to indicate the character of the

materials used rather than the result of the procedure. I confess I do not like this use of the term, and prefer my own. By all means speak of "aseptic dressings," but in speaking of aseptic surgery we ought, I venture to assert, to refer to the results of the method rather than to the materials employed. Even the term "aseptic treatment" is not quite accurate if it implies treatment without antiseptics, for the disinfection of the skin cannot be carried out without antiseptics. As a matter of fact, however, it is only in certain details that differences exist between those who still adhere to the full Listerian views and those who go to extremes in the avoidance of chemical antiseptics. For my own part, I still adhere to the moderate party—if I may so term it—and consider that antiseptics should not be discarded altogether, but that their judicious use is advisable and important.

Three things have to be borne in mind in connection with an operation. In the first place we have to see that the skin of the operator and the patient is as thoroughly disinfected as possible, and that no instrument or other article which comes in contact with a wound is soiled with living bacteria; in the second place, we have to avoid accidental infection of the wound during the operation; and in the third place, we have to avoid infection of the wound subsequent to the operation.

As regards the first point, we have to consider the disinfection of the chief things which must of necessity come in contact with the wound, and more especially the disinfection of the skin of the patient in the region of the operation, and of the surgeon's hands and arms, for the chief source of contamination of wounds with pyogenic organisms is no doubt the skin of the patient and of the operator. I do not think that there is any real divergence of views as to the necessity for this procedure, and there is general agreement that this can only be satisfactorily carried out by the use of antiseptics. No doubt there are considerable differences in the methods of disinfecting the skin, but I need not go into them. It is true also that a few surgeons are content with rinsing the skin of the patient and of their own hands in boiled water, but I fancy that most will agree that that does not meet the requirements of the case.

In addition to the disinfection of the skin a good many surgeons take the precaution of wearing gloves in case the disinfection of the hands has been imperfect; indeed, some apparently wear gloves without disinfecting the hands, looking on the sterilized gloves as a complete safeguard. Rubber gloves no doubt may be depended on so long as they are free from holes, but as they are liable to be punctured or torn it is somewhat rash to trust to them entirely, and therefore I think that whether gloves are to be worn or not the hands should be as thoroughly disinfected as possible. In fact, in putting on rubber gloves I always fill them with 1 in 2,000 sublimate solution, and in this way a little of the solution remains in contact with the skin of the hands and continues to disinfect them, a point of some importance should the gloves give way during the course of the operation. As regards this question of wearing gloves, I have previously said that the results at the present time are no better than they were by the Listerian method, before these extreme precautions were introduced—in fact, could not be better; and therefore gloves are not at all a necessity for those who do not discard the use of antiseptics.

Formerly instruments were disinfected in 1 in 20 carbolic lotion; now they are universally boiled, and although in most cases the former method is quite effectual, boiling is, I think, much more satisfactory, especially in the case of toothed instruments, such as Spencer Wells's forceps, &c. At the same time, boiling in ordinary water tends to blunt sharp instruments, such as knives, scissors, and needles, and in the case of those three I prefer to immerse them for a short time in undiluted carbolic acid, and then in 1 in 20 carbolic solution in place of boiling them.

Among other things which come in contact with a wound during an operation, and which may convey infection to it, I may specially mention sponges. I think it will be generally admitted that for the purpose of removing blood from wounds marine sponges are superior to swabs, and yet the great majority of surgeons have given up their use. This is, I believe, in the main dus to the conviction, which seems to have become deeply rooted, that heat is the only dependable method of disinfection, and marine sponges are ruined by heat; and also to the terror which some peaple have of antiseptic solutions. 1 in 20 carbolic acid will destroy bacteria and their spores in twenty-four hours, even in an albuminous fluid; if marine sponges are kept in this lotion for a week they may certainly be depended upon to be completely disinfected. This is not a matter of theory, but of experiment. For my part I always use marine sponges. They are thoroughly washed and immersed in 1 in 20 carbolic acid for at least a week before use. It is quite easy to wash out the carbolic acid from the sponges subsequently either in a weak sublimate solution or in sterilized salt solution. I have never seen any reason to reject marine sponges, either from the point of view of asepsis or from that of irritation by antiseptics, and as a method of drying a wound there is no comparison between them and swabs. Apart from the greater usefulness of marine sponges, I object to swabs in aseptic cases, because, as they do not absorb fluid readily, there is more rubbing and consequent disturbancè of the surface of the wound when swabs are employed, especially if they are used dry; and further, except in specially made swabs, threads are apt to be left behind in the wound, which may form a nidus for the development of bacteria, if they have entered during the operation. The importance of the latter point is by no means inconsiderable. For example, we find in the early experiments on tetanus that infection could not be brought about at all readily unless the bacilli were attached to some inert substance such as silk thread. If injected subcutaneously in small numbers in suspension in fluid, no effect was produced, while silk threads soaked in a suspension of bacteria and placed beneath the skin led to the desired result. I venture to think that the way in which marine sponges have been thrown aside, and swabs, whether wet or dry, have been substituted, is regrettable, and introduces an unnecessary complication into the operation.

We may say, therefore, that as regards the preliminary disinfection, heat, especially in the form of boiling, is the most certain and best method of sterilization; but we cannot do without chemical antiseptics for the disinfection of the skin, and of various articles, such as marine sponges, which are of great use during the operation.

The second point—and it is one of the greatest importance—is to

avoid soiling of instruments, hands, and consequently of the wound itself during the course of the operation. No doubt bacteria are constantly falling into the wound from the air during the operation, but it is well to diminish the number that may get in as much as possible, while it is important not to introduce masses of organisms, especially of pathogenic ones, as may be done if the hands of the operator touch surrounding objects which are not free from bacteria and are then put into the wound, or in many other ways which an observant surgeon will notice, but which are too numerous to mention. We must therefore so arrange matters that in the course of the operation there shall be as little chance as possible of accidental introduction of masses of bacteria into the wound, whether by the surgeon's hands or instruments, or in any other way.

The first thing that is done in order to diminish this risk is to surround the area of operation widely by aseptic cloths. About this point there seems to be no question in any of the plans adopted; the usual method is to cover the blankets, skin, &c., over a wide area in the vicinity with towels which have been sterilized by superheated steam. Personally, I prefer to sterilize the towels by boiling them. I think it is a much more certain way of carrying out the disinfection, especially when we see the small sterilizing machines which are on the market at the present time and which are so much used, and realize that they cannot sterilize materials placed in them, especially when the latter are packed at all tightly. From the point of view, then, of complete sterilization I much prefer to boil the towels; the only advantage of the dry towels is the question of keeping the patient dry, but as in any case mackintoshes are first applied over the surrounding area, the moisture of the towels need not penetrate to the patient. After boiling the towels, I have them immersed in an antiseptic solution, usually 1 in 2,000 corrosive sublimate, and the sublimate is not wrung out to any extent before spreading out the towels. The result is that any dust which falls on these towels comes in contact with an antiseptic solution, and as regards non-spore-bearing organisms such as the cocci, which are the chief enemies to be guarded against, disinfection will probably occur very rapidly, while even in the case of spore-bearing organisms it is quite possible that the spores may have their growth, at the very least, inhibited by the action of the antiseptic, so that the tissues may be able to dispose of them before they begin to grow. In the same way instruments laid down on the towels remain in contact with an antiseptic, and are not so likely to become contaminated as if laid on dry cloths. For the same reason I prefer, instead of using dry sterilized linen overalls, to use a mackintosh apron, and to have fastened in front of it a piece of towelling which has been boiled and wrung out of 1 in 2,000 sublimate solution. The insignificant amount of antiseptic which might get into the wound from these sources during the course of an operation could not possibly have the slightest effect; it would at once mingle with the blood and be precipitated and thereby rendered inert.

As regards the instruments, after being boiled they are very often placed in salt solution, and left there during the course of the operation; in other cases they are kept in alcohol. As regards salt solution, the same thing applies, as I have already pointed out, with

regard to dry towels. In the course of time, and not a very long time either, the surface of the salt solution becomes covered with floating dust, and an instrument taken out of it will carry with it a considerable amount of dust, which dust retains its vitality. At the same time as the operator picks out instruments he gets dust on his fingers, and while—as I have repeatedly pointed out—this dust is in the great majority of cases innocuous, it may not be so, and it introduces a possible loophole for infection. Hence, just as I have the towels moistened with an antiseptic solution, so I prefer to keep the instruments in an antiseptic solution till they are required for use, that which I use being 1 in 20 or 1 in 40 carbolic solution, which does not injure the metal. In that case the dust falling into the lotion becomes speedily acted upon, and all dangerous organisms are rendered inert. I much prefer the carbolic lotion to alcohol, which is not an active antiseptic, and it is just as easy to rinse the antiseptic off the instruments after their removal from the lotion as it is to rinse the alcohol from them.

Another point which has been the source of very considerable trouble to those who avoid the use of antiseptics has been the question of disinfecting ligatures, sutures, &c. As silk and material of that kind are easily enough disinfected by boiling, the troubles which have arisen in connection with deep sutures must, in my opinion, be explained by infection of the material during the course of the operation. This, as I have tried to point out, may quite readily occur where the use of antiseptic solutions is barred. Apparently the greatest difficulty has arisen in connection with catgut, and to some the difficulty has seemed so great that they have practically abandoned the use of this material. This, I think, is a great pity. Personally, I do not have any trouble with catgut, and I always use Lister's sulpho-chromic gut. As it comes from the instrument maker it is, of course, covered with bacteria. I do not think, however, that bacteria are present, at any rate in any numbers, in the substance of the catgut, because in the process of preparation the bacteria there must have been pretty thoroughly killed, but there is no doubt that on the surface there are any number of organisms. To those who believe only in boiling, or who are afraid of any antiseptic getting into the wound, the disinfection of the catgut presents the greatest difficulty, because boiling in water spoils catgut, however it is prepared. Hence, methods of sterilization by boiling the catgut in various solutions have been introduced. It must be remembered, however, that Lister had in view other points besides the aseptic character of the material in his method of preparing catgut, such as the strength of the knot, the length of time required for absorption, and so forth. Of late, these points in the preparation of catgut seem to have been lost sight of, and the main question which has been considered has been how to sterilize it. As a matter of fact, I have never found any difficulty in sterilizing catgut, nor have I seen any disadvantage from its use. I always keep the chromicized gut as obtained from the manufacturer in 1 in 20 carbolic solution for at least a week before using it; indeed, in order to make certain of its disinfection I place it in the first instance for a few hours in undiluted carbolic acid, and then for at least a week in 1 in 20 carbolic solution. Before use I place it in weak sublimate solution, so as to soak out the carbolic acid, and I have never seen any reason to attribute any

irritation of the wound to the minute amount of antiseptic which may be carried in with the catgut. As a matter of fact, my belief is that with catgut, as with silk, the real trouble is due to reinfection of the material during the operation, and I think this is only another example of how the extremists handicap themselves by their fear of antiseptics.

Coming now to the third point, viz., the question of preventing infection of the wound after the operation is completed, I think that we have here the most important difference between the extremists and the Listerian school. Lister from the first pointed out that an essential part of the treatment was to prevent the possibility of infection of the wound after the completion of the operation. Now infection of the wound after the operation takes place by the growth of bacteria in the blood and serum after they escape from the wound and in the dead epithelium on the surface of the skin, and their subsequent penetration into the wound along stitch tracks, drainage openings, &c. With the view of avoiding this growth, Lister arranged that the discharges from the wound should be received into dressings which contain an antiseptic in such amount that when dissolved by the discharge it will render the latter an unsuitable soil for the growth of bacteria. As was pointed out in a paper read by Lister at the Medical Society of London some years ago, it is not necessary that the amount of antiseptic thus communicated to the discharge should be very great. All that is wanted is to add enough antiseptic to the discharge to inhibit the growth of bacteria, not to produce a solution strong enough to kill them; and by following that principle it is not necessary to put on dressings containing antiseptics of a character or in sufficient amount to irritate the skin.

To carry out the purpose of this dressing a large mass must be put on, and not the small pieces that one so often sees used. If it fails in its object it does harm instead of good, for it interferes with the drying up of the discharge, and, keeping it warm and moist, favours the development of bacteria in it. This plan was tested long ago by Lister and was given up as being unsatisfactory.

If I were to go over to the extreme party and abandon the use of antiseptics—which I have no intention of doing—I should not apply any dressing to the wound at all. If the wound is left open and protected from direct contact with septic materials, the blood and serum which ooze out in the first instance will very soon dry up and form a scab which will prevent infection of the interior, and if I were dressing wounds in that way I should build up a mass of aseptic dressings on each side of the wound and then fix a thin layer of wool or gauze over the surface, but not touching the wound, so as to protect it from dust. Where wounds can be completely closed from end to end I think the great majority would do perfectly well if treated in this way, and probably better than if covered with plain sterilized dressings, but where drainage has to be provided, as is, of course, the case in some operations, such as in some extensive breast operations in fat people, in draining joints, &c., the problem is different, and there I think that it is essential that the dressing should contain some antiseptic if one wishes to be certain of the result.

To sum up the criticism which I have to make on the most recent ideas on the treatment of wounds, it is that the pendulum has swung

too far in the direction of the avoidance of antiseptics, and that the reasonable use of all the means at our disposal for securing asepticity of wounds will furnish more constant results. The chief point to which I take exception is the employment of dressings which do not contain an antiseptic in sufficient amount to render the discharges which flow through them unsuitable for the growth of bacteria. And a second point which I also think is very important is the absence of antiseptic solutions during the operation in which hands, instruments, &c., may be washed from time to time to insure a continued asepsis. A third point which I think is a retrograde step is the substitution of gauze plugs for drainage-tubes, more especially for the drainage of abscesses and sinuses. Minor points are the use of swabs instead of marine sponges and the avoidance of catgut. This extreme view has, however, done good, especially in the way of directing attention to the value of heat as a disinfectant for various purposes in connection with operations. There is no doubt that the sterilization of instruments, towels, &c., by boiling, and of dressings by a current of superheated steam, adds very distinctly to the certainty of the results. It has also done good by calling attention to the importance of diminishing the amount of dust which may get into wounds at the time of the operation, although some of these precautions have been given an importance which they do not deserve.

It always seems to me—and I say this from a large experience in bacteriological work—that the attempt to treat wounds without any antiseptics is a very unnecessary complication. In the first place, it is ever so much more difficult to secure asepticity of a wound under such circumstances than if one takes advantage of antiseptics, and in the second place it requires a man who is especially skilled and experienced in bacteriological work to bear in mind the various loopholes which have to be guarded against in order to obtain a constant aseptic result. I say that bacteriological experience is necessary because the surgeon has to concentrate his attention on the object of the operation rather than on the aseptic technique, and in order to carry out the object of the operation satisfactorily and at the same time without the risk of sepsis the aseptic technique must be practically automatic. Therefore, if he has to be thinking all the time not only of the object of his operation but of the various loopholes which may arise and which he must most carefully avoid, seeing that he has no antiseptic materials at hand with which to rectify mistakes, one or other point must suffer: either his operation may not be carried out as he would desire it, or his aseptic technique is apt to be faulty. I confess that I can see no reason for this great dread of a drop of antiseptic meterial getting into the wound; I can only say that my own results, and those of surgeons who use antiseptics judiciously, are in every way as good as those obtained with the more elaborate aseptic precautions; in fact, seeing that we are not troubled with sepsis or stitch abscess at all, I venture to assert that they are better, because they are more constant and dependable.

(*Lancet.*)

ABNORMALITY IN THE ARTERIAL SYSTEM OF THE FORE-LIMB OF THE HORSE.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR OF ANATOMY IN THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

In a former number of this Journal (December, 1907), I described a few abnormalities which I met with in dissection of arteries in the horse. At that time I noted a variation of some importance in connection with the forearm in which two arteries of similar size were found on the inner side of the forearm, and closely related at the point at which the pulse is taken from the posterior radial artery. The posterior radial artery in that position appeared to be double. In November last my attention was drawn to a similar, but not exactly identical, condition.

The subject was an aged black gelding, and the limb containing the abnormality was the near fore. The off fore-limb was quite normal. In the near fore-limb two arteries accompanied the median nerve over the inner aspect of the elbow joint. One in point of origin and position was the posterior radial artery proper, the other a distinct freak of nature.

The posterior radial artery, detached from the brachial at its usual place over the inner condyle of the humerus, passed downwards over the internal lateral ligament and upper fourth of inner border of radius, accompanied by the median nerve and crossed by the abnormal artery. (The median nerve at first was situated in front of it, but later became superficial to the artery.) The posterior radial artery placed itself behind the bone in front of the flexor metacarpi internus, and immediately gave off the interosseous artery of the forearm. The continuation of the parent vessel below this point was very small, but maintained its normal course downwards in the forearm between the bone and flexor metacarpi internus, accompanied by its sateleite veins and the median nerve. It ended above the pisiform bone by joining the ulnar artery to form the supracarpal arch.

The other vessel was an exceedingly large one, equal in size to the first portion of the posterior radial artery. Given off from the origin of the ulnar artery, it descended over the first portion of the posterior radial artery and median nerve at the inner side of elbow underneath the posterior superficial pectoral muscle. It then passed downwards superficially along the inner border of the radius, with the internal subcutaneous vein of the forearm immediately in front of it. About the middle of the shaft of the radius it placed itself behind the inner border of the bone. Here it lay upon the flexor metacarpi internus, at first immediately under the skin, but later below the superficial fascia. A little above the carpus it divided into the large and small metacarpal arteries. The following other minor peculiarities of the arteries in the forearm were also noted :—

(1) *The interosseous artery of the forearm* passed outwards from its origin through the radio-ulnar arch and terminated in the neighbouring muscles, the extensors pedis and suffraginis and flexor metacarpi externus. Before it entered the arch it gave off a small unnamed branch, very exceptionally seen.

(2) *This branch* descended behind the radius at the margin of its junction with the ulna, and was expended in the carpus.

(3) *Anterior radial artery* sent a branch downwards from the front of elbow joint under the extensors, metacarpi magnus, and pedis to replace the interosseous artery on the outer side of the forearm. This vessel descended at the junction of radius and ulna in front of the extensor suffraginis. It broke up into branches for the supply of the front of the carpus.

A CONTRIBUTION TO THE STUDY OF FOLLICULAR MANGE IN THE DOG.[1]

BY NICHOLSON ALMOND, F.R.C.V.S., SURBITON, SURREY.

THE subject to which it is now my privilege to direct the attention of the Fellows of this Society is one that has always had a great attraction for me; this, I think, has been partly due to the acknowledged difficulty, and, in many instances, the denial that a cure is ever effected, and partly to its comparatively rare occurrence in those parts of the country in which my practice has been formerly carried on.

The first difficulty in pursuing this study will be that of diagnosis, and this to me has been in many instances one of great difficulty, a positive diagnosis being sometimes delayed for months. By a positive diagnosis is meant the demonstration of the parasite which is said to cause the disease. It is not my intention to take up your time in describing an object so well known as *Demodex folliculorum* of the dog, and which, once seen under the microscope, will always be recognized. I wish it were in my power to tell you something more definite about the life-history of this organism, and of the conditions which determine its spread and favour its development. There is only one factor that strikes one as entering into the majority of the cases that come under our notice, namely, the condition of youth, and that period of youth known as the age of puberty. But although, at this period, in my experience, it is most common, the disease is not confined to this time of life, but may be met with in the young puppy suckling its mother, and in the mature animal.

There are certain factors which seem to point to the probability that the disease is contracted during puppyhood, and remains latent in the skin for months, only developing when certain undefined conditions assert themselves, or, in other words, when the environment is favourable to the development of the parasites. This conclusion has been forced upon me by the comparatively large number of dogs brought to be examined when about six to nine months old, the history being that the subject of inquiry passed into the possession of the owner when quite young, and had not been in close contact with other dogs since. Such latency is not inconsistent with the later behaviour of the disease when under treatment and subsequent observation.

In my opinion there is a large amount of evidence that the disease under consideration is much more common than is usually supposed, that in the early stages it often yields to simple remedies, its true character not being recognized, and that even spontaneous recoveries

[1] Read at the December meeting of the Central Veterinary Society, London.

occur. This opinion is based upon data, of which the following will serve as an illustration: A bitch, showing no very definite signs of the disease, has a litter of puppies; half the number appear to be healthy, the others have hairless patches, and thinning of the hair in other regions, with, perhaps, a few red spots. Two-thirds of the litter remain well or recover under the mildest treatment; the other third may develop follicular mange.

Symptoms.—The following is a description of the recognized symptoms of the disease, written by Mr. Hunting nearly forty years ago: "They consist merely of circumscribed spots, from which the hair falls, and upon which are noticeable a few small 'red' pimples. These patches extend 'more or less' rapidly, and fresh ones appear on other parts. Any portion of skin may be affected, but the head, legs, belly, and sides are usually the seats of the disease.

"The affected parts are almost hairless, and what hair remains is easily pulled out. Small pimples and pustules stud the surface, varying in size from a pin's head to that of a pea.

"The confluence of the pustules and the discharge of their contents give rise to scabs; these crack and bleed, and so produce a most repulsive appearance.

"In white-haired dogs the skin is red; in all it is extremely hot, and emits an unpleasant odour.

"The irritation does not excite much scratching, but the dog frequently shakes himself. More pain than itching seems to acccompany the disease.

"In cases where the whole body is affected, loss of condition is most marked, and in cold weather the almost total loss of hair may cause death, if the animal be not kept in a warm place. This stage, too, is always accompanied by a ravenous appetite, due probably to the rapid loss of animal heat."

This is an excellent description of a well-marked case in which the diagnosis would not be difficult. It is not so easy in the so-called squamous form of the disease, when, in many cases, besides a loss of hair in limited areas, one only finds an increased desquamation of epidermis, the surface of the skin being dry and showing no signs, or only very slight ones, of inflammation. The lesions of this form occur especially around the eyes; the hair has mostly fallen out, leaving a thinned, if not bare, surface around them, the skin being slightly reddened and covered with epidermal scales. This limited appearance, with such slight reaction of the skin, makes the diagnosis somewhat difficult, because the chief characteristics of the disease—the acne nodules, and acne pustules—are absent. For this reason, every case of hair falling out, accompanied by slight skin inflammation on the eyelids, should be regarded with suspicion and examined for acari. This kind of eruption is not rarely found in patches in various parts of the body, and usually without any or little itching; and my experience is that these conditions may continue for months without making any very definite progress, until, at some uncertain period, red pimples may develop, and later semi-purulent or sebaceous matter collect in one or more of them, in which the demodex may be found. The acari are more easily observed in the small nodules, with apparently purulent contents, and in those which merely yield a kind of cylinder of sebaceous fat on pressure. In case of difficulty, the specimen may be

clarified by ether or alcohol. The visible infection may be confined to a small local area, and never extend, recurrent eruptions and recovery taking place and extending over a very considerable time. An affirmative diagnosis may be made from the following symptoms:—

Diagnosis.—Partial or complete depilation of limited areas of skin; affected parts usually hot, swollen, and, on being folded, seem to be visibly thickened when compared to other parts.

The distinctive features are: groups of acne pimples of various sizes, the pimples being red and very persistent. The persistent red spots, pustules, thickened and hot skin, with shaking of the body and comparatively slight itchiness, are nearly diagnostic, which microscopic examination of contents of pimples, usually confirms.

The following facts will illustrate the difficulties of diagnosis and the infective power of the disease in a given instance. A client, a lover of dogs, had a smooth-haired Irish terrier stray into his yard; he noticed a thinning of hair in certain parts. The dog, which was a young one, was allowed free access to his own dogs. He brought the terrier to me for examination on January 9; it remained in my care—not for treatment—till March 2, when he found a home for it. Whilst under my observation the skin was frequently examined; there were small bare patches and other places about the head and body, where the hair was "thinned"; a few pimples, very small, were seen, but no acari were discovered; numerous scrapings of the skin and contents of the discrete pimples were microscopically examined, and notwithstanding these failures we were convinced it was a case of follicular mange. As previously stated, the dog went into its new home on March 2, and on Juue 3 it was brought to me on account of disease of the skin. On examining the contents pressed out of pimples on the skin we found they contained very numerous acari. As evidence of infectivity the following series of events occurred after the terrier's fortnight's stay with my client's dogs.

A dachshund bitch, in whelp, that had been in contact, contracted the disease, and came under treatment on May 18. She had two puppies; one had the disease, the other remained healthy until he died of a fit when from 4 months to 5 months old. The bitch was in the habit of lying with a retriever, and used to lay across the loin of her companion when resting together, and at this part of the body the retriever was infected. The bitch was also in the habit of playing with a fox-terrier dog, the property of another person, and he contracted the disease on the inner side of both fore limbs and about the face; and was brought for treatment on August 13.

Another instance of infection may be given: Two Great Danes affected had introduced into their kennel a deerhound. She contracted the disease and afterwards had a litter of puppies that became infected.

Treatment.—The first case that recovered under my care was one of the worst I have seen or treated. The subject was a clumber spaniel. No region of the skin seemed to have escaped; the face and ears were very badly affected, and large sebaceous cysts containing semi-purulent, often blood-stained, fluid poured their contents upon the chest and limbs below, which were also seriously involved in the almost general infection. What appeared to be deeply scarred surfaces were seen about the head and other parts of the body; the amount of

discharge thrown out was so great that it appeared to bathe the parts over which it flowed. You will note attention is directed to what appeared to be deeply scarred surfaces; they conveyed to the mind of the observer the impression that the deeper structures of the skin were fissued and contributed to the general outflow. Your notice is called to these points because, much to my surprise and satisfaction, when the animal recovered no scars or uneven surfaces were left, nor were the hair follicles destroyed. The treatment adopted in this case consisted in bi-weekly baths, sometimes even more frequent, and painting the affected parts with a solution of nitrate of silver in water, 20 gr. to 1 oz. But great difficulty was experienced in bringing the diseased surfaces and the solution into contact, and it was ultimately given up in favour of solid nitrate of silver, the point of which was daily introduced into all cysts, after their contents had been evacuated by scraping their surfaces with the blunt blade of a knife or wooden spatula: all spots were also touched with the point of the caustic. The animal, when treatment was commenced, was a complete wreck to look at, but under this process improvement gradually took place and recovery in about six months. The dog was afterwards sold for £5.

The second case, an Aberdeen terrier, showed the usual symptoms, namely, a collection of persistent red spots at various points, with loss of hair, characteristic odour, a tendency to shake himself, and no very marked irritation, the parasite being easily demonstrated.

Treatment.—Weekly bath, each spot every morning touched with solid nitrate of silver, and in the evening diseased surfaces smeared with the following mixture, and moderate friction applied:—

℞	Ol. olivæ ...	...	...	...	...	℥iv.
	Creosotum	...	...	...	...	℥ij.
	Paraffinum	...	...	...	...	℥iv.

M. ft. Lin.

This treatment ended in recovery in seven months; the last spot was on the top of the head, and persisted for nearly three weeks.

The treatment in these two cases was carried out by the owners of the dogs under my supervision, and they were careful and constant in their daily examinations and in their attention to the details thought necessary to insure success. The average owner could not be relied upon to give such daily care over so long a period, and in infirmary practice the expense would be prohibitive for the greater number of dog owners.

These two cases convinced me that follicular mange is curable, and being satisfied on that point, I looked into the Pharmacopœia with a view to discover a simpler remedy than that previously employed, and chloride of zinc seemed to possess the properties required. Lauder Brunton says of it: the chloride of zinc has no action on the unbroken skin, it is a powerful caustic, distinguished by its property of burning deeply, and not spreading sidewise like many others; it combines with albumen and coagulates it. Mitchell Bruce says the salts of zinc closely resemble in their action the salts of silver; the chloride penetrates the tissues, precipitates albuminous juices or secretions, and coagulate protoplasm. Thus this salt of zinc, while harmless to unbroken skin, has penetrating power and the property of coagulating

albumen, qualities likely to be destructive to the follicular mange parasite, while arresting decomposition of the secretions thrown out in the disease we are considering. The almost specific action of this agent in the disease known as "grease" in the horse is well known to me, and I determined to employ it of the strength used for that disease, namely, 2½ per cent. of solid zinc chloride in water. Sir William Burnett's fluid contains about 200 gr. of the salt to the ounce, and a solution of the above strength may be made by placing 1½ oz. of it in an ordinary quart (so-called) wine bottle, which usually has a capacity of 26 oz., and filling it up with water.

The third case was treated with this 2½ per cent. solution of zinc chloride in water.

The subject, a fox terrier dog, 6 or 7 months old, had been indisposed for some days; he lay curled up in a comfortable basket, covered with a blanket, was very sensitive to cold, and cried out when moved; he was so disinclined to move that, although usually a clean dog when well, at this time he would not get out of his basket to relieve himself. There was a discharge from his eyes which dried during the night and sealed the eyelids; when turned out on a piece of grass he showed a general stiffness, and it was thought he was suffering from distemper, with rheumatic or muscular complications.

Treatment was based upon this diagnosis, from October 22 to November 7, when, a widely distributed eruption having appeared on the skin, a diagnosis of the case as acute follicular mange was made and confirmed by several subsequent microscopical examinations. At this time the skin in patches in all parts of the body was to a large extent denuded of hair, and the characteristic odour was present, a prominent symptom being that the dog frequently shook himself, and there was very little itching. The owner ordered the dog to be destroyed, but at my request gave him to me, as I wished to treat him. As before stated, his skin was dressed with a 2½ per cent. watery solution of zinc, applied by a small piece of sponge. The parts more particularly affected were dressed again in the evening—no large quantity of the solution was used in the dressing; the time occupied in dressing the dog was about five minutes night and morning. After the applications the patient was given about five minutes' exercise, to give the lotion time to dry. Mode of application was as follows: The sponge, dipped in the lotion and partly squeezed out, was allowed momentarily to rest upon the parts visibly affected, and damp with the solution was passed over the rest of the surface of the skin.

The dog was first dressed on November 11, 1906; last dressed, December 22, 1906. He was exhibited to the Fellows here on January 10, 1907. On that date no spot was visible on the skin, although a slight odour was discernible. After a considerable lapse of time, of the length of which no record has been made, a few spots again appeared, and were allowed to develop and extend till the demodex was easily demonstrated in large numbers, confirming, although that was hardly necessary, the previous diagnosis. The same treatment was then successfully renewed, and the animal quite cured.

Since the above case the following breeds of dogs have been treated successfully for follicular mange by the method above described: The spaniel, Pomeranian, deerhound, Great Dane, Aberdeen

terrier, retriever, dachshund, fox-terrier, bull-terrier, bull-dog, and mongrel.

The length of treatment necessarily varies with the chronicity of the case. A bath has been given from time to time for the purpose of cleanliness. In neglected cases with comparatively dry skin and more than the usual irritation, often due to a mixed infection, it has become part of my routine practice to begin treatment by dressing the patients with an ordinary mange dressing:—

℞	Sulphur nigran	ʒij.
	Ol. picis	ʒj.
	Ol. lini	ʒviij.
	Paraffin	ʒij.

M. ft. Lin.

A bath is given four days after, this dressing and bath being repeated before the specific treatment is begun.

CASE OF POISONING BY SMUTTY GRAIN.

BY M. GEORGES IRR, ORAN.

GENERALLY one considers carbonized grain as not very nutritive, but not toxic. M. Irr has observed poisoning by uredo carbo.

A mule showed violent colic, with this peculiarity, that as soon as it was at its height he threw his head back forcibly and hit the wall or the manger, then fell to the ground, and struggled violently. He received an injection of pilocarpin and eserin, and was put for four days on prescribed diet, which resulted in complete cure.

On the evening of the same day, another mule presented the same symptoms, was treated in a similar way, and recovered.

Some days after, M. Irr was called to make a *post mortem* on a mule, dead after having had the same signs. The thoracic cavity presented nothing abnormal, stomach almost empty, as well as the intestine, but the mucous membrane presented traces of very plain inflammation. The animals had eaten oat forage, which had been cut because it was smutty, in the proportion of more than 40 per cent. All the animals of the farm had presented intestinal trouble, diarrhœa, and they shrank, lost appetite, and became dull. Suppression of the oats caused quick recovery.

The mule of another colonist presented the same symptoms and succumbed. He had eaten new barley, which the proprietor had not been able to sell on account of carbonized grains.—G. M.

(*Revue Algérienne et Tunisienne ex. Le Bulletin Vétérinaire.*)

Clinical Articles.

ENDOMETRITIS IN THE BITCH TREATED WITH OZONE.

BY GUY SUTTON, M.R.C.V.S., OXFORD STREET, LONDON, W.

In July last I had brought to my notice a Scotch terrier bitch. For some time previously, Mr. Sefton Sewill, to whom she belonged, had observed an extreme depression of her usual good spirits, and for the last week she had frequently vomited, and when sitting down soiled her cushions with discharge from the vagina. This discharge was of a yellowish-grey colour, and in amount might be roughly estimated at one tablespoonful in twenty-four hours. The abdomen was distended and tender to deep pressure, and on the right side the uterine horn could be distinctly felt through the abdominal wall, giving the impression of a semi-solid cylindrical body of about the thickness of the first two fingers. The bitch had the general unkempt and disordered appearance so constantly noticed in animals suffering from uterine disease. The rectal temperature varied between 101·4° and 103° F. The appetite was capricious. She was markedly thirsty, and frequently vomited immediately after taking food or water in any but the smallest quantity. Her age was 7, and as far as I can ascertain she had never been served.

For three weeks she was regularly irrigated night and morning with warm antiseptic lotions. A large douche was used, and the glass nozzle of the delivery pipe introduced directly into the enlarged uterine horn. Solutions of chinosol, potassium permanganate, boric acid, argyrol, sulphate of zinc and aniodol were all tried, and at the same time she was given ergotine, aloes and iron as uterine tonics. Under this treatment the general condition improved, and vomiting became less frequent. Still, the purulent discharge persisted, and though less in quantity returned to its original volume immediately the irrigations were stopped. At the owner's request Dr. George Stoker consented to treat the uterine conditions existing in this case with ozone. The boric acid injections were continued during the treatment, but the uterine tonics stopped.

The ozone was prepared from pure oxygen, the ozonizer being excited by an electric current of one ampère, passed through a Rhumkoff coil. A flexible tube terminating in a glass vaginal nozzle was attached to the ozonizer, and through this the ozone was injected directly into the uterine horn. Each application lasted from fifteen to twenty minutes, and in fourteen applications, extending over three weeks, the bitch was completely cured. The discharge decreased from about the third application, it became clearer and less purulent, and lost its offensive smell.

Three months have elapsed since the treatment was concluded, and the bitch is now quite well. There is no discharge from the vagina, and the uterine horn has apparently returned to its normal size and condition.

One of the most interesting features in this case, and as I am informed in this treatment, are the bacteriological changes that take place under the influence of ozone, and I am sorry I am unable to reproduce photomicrographs.

Gelatin tubes inoculated from material taken by means of a platinum loop and speculum from the interior of the uterus when cultivated emitted a most foul and offensive smell. Similar tubes inoculated after seven applications of the ozone were quite odourless.

I quite realize that this is but a single case, and that possibly no definite conclusion can be arrived at therefrom. Still, the improvement was marvellous under ozone, and from what I have learnt from Dr. Stoker who has had a large and unique experience in this matter, I am convinced that there must be many cases of diseased natural and also of pathological cavities, that would derive the greatest benefit from the use of ozone. Certainly with this evidence it demands a trial. For many clinical particulars in this report I am indebted to Mr. E. Batt, M.R.C.V.S., and Mr. McGuire, M.R.C.V.S., and to Dr. Stoker for the technique of application.

ANTISTREPTOCOCCIC SERUM IN THE TREATMENT OF STRANGLES.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

It is not reasonable to draw conclusions from the results obtained by any agent in the treatment of single or a few cases of disease, but if every one trying a particular line of treatment were to record faithfully the details in each particular instance, some useful information would be given, and perhaps an inference of some value drawn from the sum total recorded. It is with that idea in my mind that I venture to publish the details of a case of strangles, into which I injected a dose of antistreptococcic serum to see if any beneficial effect would be produced.

The antistreptococcic serum used was supplied by Meister, Lucius and Bruning, Ltd. It is called Strangles Serum "Hoechst," and is prepared by immunizing horses against strangles by injecting cultures of the specific streptococci. I have been led to understand that it is a polyvalent serum. The animal for which I employed the serum was an aged grey mare.

History.—She had received an injury to the jaw while at grass. The wound which resulted was on the near side, over the ramus of the inferior maxilla, below the masseter muscle. This wound in the first instance was not treated. During this time the mare was associated with a 3-year-old pony filly which had developed the typical symptoms of strangles. In the lesions in the filly the streptococci of strangles were easily demonstrated. The wound on the mare showed no tendency to heal spontaneously, and abscesses formed in the neighbourhood.

On September 7 last the mare was taken in for treatment after some of the abscesses had developed. The cheek of the affected side was exceedingly hard and swollen from the masseter muscles downwards to and including the lower lip. The wound above referred to discharged a creamy, thick pus, in small quantity. On the swelling six small abscesses had formed, three of these had already burst, the rest were pointing. Two very large abscesses were present in

the intermaxillary space, and were mature. A diffuse, hard painful swelling was noted on the parotid region of the off-side near Viborg's triangle. The temperature was 101° F. The animal was in fair condition, but not feeding well.

Treatment.—The abscesses were opened up with a Syme's knife, and tinct. iod. injected. The parotid swelling was treated with an application of mustard. Soft food was recommended.

On the 10th the swelling on the parotid region had developed into an abscess, which was opened and evacuated. Tincture of iodine was injected daily into all the abscesses which had been opened.

On the 11th two small abscesses formed near the lower lip, and were opened and treated as before. Films of pus from this case had on previous occasions been examined, and the streptococci of strangles in pure culture were recognized. Cultures on blood serum from unopened abscesses were also made and incubated. The resulting growths were very limited, and the streptococci in them were especially abundant in the water of condensation. It was curious to note that after a few days the growth stopped altogether, and films from it stained by Gram revealed streptococci, in which a large proportion of the members failed to retain the stain. A few of the cocci, however, were larger than usual, and stained deeply. No doubt these later were the so-called arthrospores.

On this day 100 c.c. of the Strangles Serum "Hoechst" were injected subcutaneously into the side of the neck. Within the next few days a decided improvement resulted. The temperature came down to 99·8° F. The discharge from the abscesses decreased generally, and the swelling around them began to disappear. A small abscess about the size of a hazelnut developed on the left side of lower lip on the 14th, and was opened. A circular, flat, soft swelling on the neck at the seat of injection of the serum attained a diameter of about 6 in. on the 12th, but disappeared by the 16th. On the 21st all the abscesses had healed up, save the large one in the intermaxillary space. From the latter there was still a slight discharge. On September 30 this abscess also had disappeared.

On the 26th a small swelling was noticed on the left parotid region, a short distance behind the angle of the lower jaw. This swelling gradually increased. It was very ill defined, hard and painful, but showed no tendency to point. On the 30th mustard was applied to the swelling.

On October 18 the animal was again seen. The swelling was still present, but slightly decreased in size. Over it tincture of iodine was painted.

On the 19th an abscess pointed just in front of junction of the left submaxillary and jugular veins. This abscess was opened, and about 3 oz. of typical strangles pus were discharged. Here again the pus contained only streptococci. The abscess was irrigated with a solution of Jeye's fluid and with tincture of iodine.

On the 26th a second abscess pointed near the opening of the first one. A common opening was made for the two.

On the 30th a large abscess, about the size of an apple, pointed about 2 in. below the above opening behind angle of lower jaw. This abscess was also opened, and about 4 oz. of pus removed. It was treated daily as for former lesions. By November 10 the abscesses

had entirely healed up, the swellings gone, and the animal had completely recovered. Later, the animal was put to work, and is now doing well.

Remarks.—The first point one is likely to notice in the case is its duration. The affection lasted from the beginning of September to November 10. In the second place, an apparent improvement resulted shortly after the injection of the serum, but it did not prevent the development of abscesses. In the third place, a period of about forty-nine days elapsed between the injection of the serum and the pointing of the last abscess, and twenty-three days passed before the swelling on the left parotid region began to point. The explanation of this slow development is that probably the serum did produce a certain immunizing effect which permitted the animal to resist the invading organisms for a time, but was not sufficient to completely destroy or get rid of these organisms without the ultimate formation of abscesses. Here again the last abscesses which did form were among the largest noted in this case. Lastly, it may be said that the above was not a typical case of strangles. The animal was old, the temperature was never high, there was no discharge from the nose, and many of the abscesses, most of the primary ones, were not developed in connection with the lymphatic glands, but only in the subcutaneous tissue. However that may be, the infection was one of strangles streptococci, and the reason that serum was used at all was that the case appeared to be such a bad one, and the abscesses were so numerous. It is claimed for the serum that it will always prove successful provided the lymphatic glands are not already extensively purulent. It is quite possible that exception may therefore be taken to the results recorded in this instance.

DISLOCATION OF THE EYEBALL IN A DOG.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

On November 21 last, a chocolate-coloured Pomeranian dog, aged about 2, was brought into the Royal Veterinary College of Ireland. The left eyeball protruded out of its socket in front of the eyelids, and the conjunctiva, especially over the sclerotic, was swollen and intensely congested. The cornea was dim. The dog objected to manipulation of the eyeball.

History.—The owner of the dog stated that the above condition was the result of an accident which had occurred the previous day. A large collie dog with which the Pomeranian had been playing struck him with its paw over the eye. After the occurrence the irritation appeared to be very great, for it was only with difficulty that the patient was prevented from damaging the protruded eyeball with his fore-paws.

Treatment.—The conjunctiva was moistened with a few drops of a 4 per cent. solution of cocaine hydrochloride to produce local anæsthesia. It was then washed with a lukewarm solution of boracic acid in water (20 grains to the ounce) to remove the dirt and relieve the congestion. A little castor-oil was then applied, and an attempt made to

manipulate the eye back into its socket. The palpebral fissure, however, was too small to permit of reduction in this way. An incision was therefore made with a probe-pointed pair of scissors, through the skin and conjunctiva for about $\frac{3}{8}$ in. outwards from the temporal canthus. Then the eyeball was easily put back in position. The incision was sutured by a continuous suture of silver wire, a pad of gauze and cotton put over the eye, and kept in position by a bandage. The eye was afterwards treated twice daily with a collyrium of—

℞ Acid. boracici... ... ... gr. xv.
Ext. belladonnæ virid. ... ... gr. v.
Aquæ ... ... ad ʒi.

in order to reduce the conjunctival congestion.

Progress.—In a week's time the sutures and bandage were removed. The only lesion left was a slight opacity of the cornea (nebula). This nebula was treated with calomel (which was blown into the conjunctival sac) on two occasions, with an interval of three days between. It disappeared within a week after the bandage had been taken away.

SPINAL FRACTURE WITHOUT DISPLACEMENT.

BY E. A. RYAN, M.R.C.V.S., STROKESTOWN, CO. ROSCOMMON, IRELAND.

HAVING read a case reported by Professor Wooldridge and Mr. Chatterley in the November number of the VETERINARY JOURNAL, I thought the following might be of interest.

A big, lumbering, 16-hands, untrained, half-bred gelding, aged 3, —one of four to be fired. Being unhandled, and consequently very wild, and having a roach back, I did not at all like putting him down, especially as he had only one small curb. I pointed this out to the owner, but he would have him fired; so I preferred casting to doing him standing, as he mildly suggested. I had him out in a field, where I had just cast three others, and put him down without any trouble; in fact, he came down much easier than any of the others. I fired him on the two hocks—which I usually do. It keeps one hock from "laughing at the other." I also think it a wise thing to do, especially in a horse of this age, as it is often the case that a curb develops on the other hock during the next year or two of life; and besides, they are more saleable when fired on both when there is any sign of curbs.

While firing, he struggled a good deal, and continued to do so till I let him up. He got up almost immediately, without the least trouble, and, being allowed to join his comrades in the same field, he galloped over to where they were, and continued to gallop with them for some time, till they settled down and commenced to feed. I saw the horses again about four hours after, and everything seemed quite right; in fact, when I tried to get near them, they commenced to gallop round the field again, and this one went as well as any of them.

Next morning I had a wire saying he was stiff, and asking me to to see him. When I saw him he could move quite well in a straight line, but when turning he had lost power of co-ordination of movement in his hind limbs. I made no manual examination, as I considered the stiffness was due to muscular strain. I told the owner to put him in a small field with a donkey to keep him quiet, and let me know how

he was next day. Up to this time the horse was feeding, and was not apparently in any pain. Next day I had a wire saying that he was down and unable to get up. When I saw him this time things looked their worst. I made a thorough examination *per rectum* and otherwise, and could find nothing. Rectum and bladder were paralyzed, and the hind limbs did not respond to pin-prickings.

I now decided that whatever the injury was it would be more humane to put the poor brute out of pain, and accordingly prescribed a bullet. The owner, after some time, consented to this line of treatment, and I made a *post mortem*. I found a blood clot, about the size of one's open hand, on each side of the spinal column at the insertion of the psoas muscles, which had been considerably torn from their attachments. The body of the last dorsal vertebra was fractured, but not displaced, and above the fracture, in the spinal canal, there was a good-sized blood clot pressing on the spinal cord.

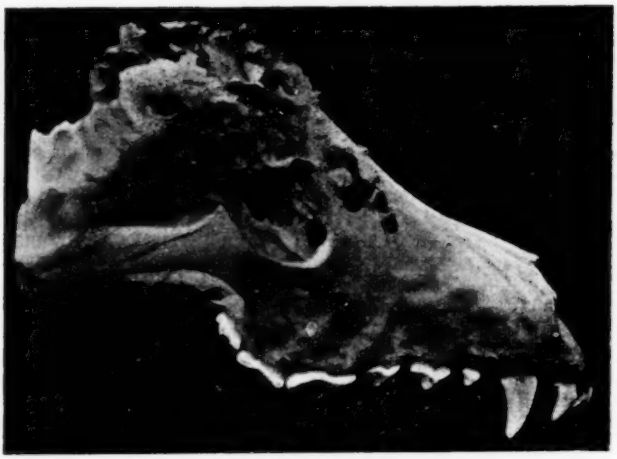
When did the fracture take place? Can a horse with a fractured back do as this one did—gallop, &c.? Had the conformation of the back anything to do with the fracture? If put in slings and otherwise treated when first seen, is it possible that the animal might recover, believing the fracture to be in existence then?

SEVERE CHANGES IN THE HEAD BONES OF A DOG FROM CHRONIC PURULENT INFLAMMATION OF THE FRONTAL CAVITIES.

BY JOEST.

A SCOTCH sheep dog was brought to the clinique for treatment with the statement that he had been trephined several months previously for inflammation of the frontal cavities. The ailment had at first improved, but then got worse again. On clinical examination the dog showed great stupefaction. As treatment appeared useless, the owner was advised to have the animal destroyed.

Post-mortem examination at the Pathological Institute showed the following state of affairs: The head appeared deformed in the neighbourhood of the frontal bone, especially on the right side there was considerable bulging. Palpation showed that this was due to bone change. The os frontale was irregularly distended and defective. In the neighbourhood of the frontal cavity to the right of the middle line, there was a round hairless scar about the size of a penny. Here fluctuation could be detected. From the right nostril there was a profuse discharge of greyish-yellow pus; at the right inner canthus between the bulb and the upper eyelid there was a fistulous opening, discharging matter. On opening the right frontal cavity at the fluctuating place it was found fitted with greyish-yellow shiny pus. A smooth mass of material was removed therefrom with the tweezers. It proved to be a piece of wadding. The meninges in their frontal-nasal part were inflamed; the pia mater minced and besodden. The cerebrium showed hyperæmia and slight œdema. The organs of the chest and abdomen showed no changes. The skull of the animal was macerated to show the bone changes. The dry preparation showed



Result of chronic purulent inflammation of head bones of dog (Joest).

that the changes commenced in and spread from the right frontal cavity. Its bony wall was perforated on all sides in numerous places. The septum between the right and left frontal cavities had completely disappeared. The right superciliary arc was corroded and covered with protuberances. The outline of the right orbit had suffered much in this way. The right frontal bone was completely destroyed, and in its place there was an irregularly perforated and protuberated bony mass similar to the changes seen in actinomycosis.

Here we have empyema following trephining, due to retention of wadding in the frontal cavity used to fill up the trepanning openings and slipping into the cavity, and subsequent healing externally.

The case is rare, but shows the characteristic bone changes which a chronic sinusitis can produce.

(*Bericht Königliche Tierärzt. Hochschule zu Dresden.*)

UMBILICAL HERNIA IN A NEW-BORN CALF, WITH RUPTURE OF THE SKIN COVERING HERNIA.

BY E. A. RYAN, M.R.C.V.S., STROKESTOWN, CO. ROSCOMMON, IRELAND.

I WAS called to deliver a cow, and when I got to the farm, about half an hour later, I found the owner had delivered the calf, which was lying on the byre floor, with all the small intestine out. On examination, I found an umbilical hernia, with rupture of the skin over it extending for about 3 in. in a longitudinal direction. It looked a hopeless case, and I told the owner so, and suggested destroying the calf. He at once told his assistants to take the calf away and destroy it, and they immediately took it by a fore- and hind-leg and half lifted and half dragged it some few yards along the filthy floor, when the owner changed his mind, and asked me to do something for it.

I had the calf back, put him on a clean sheet, and with a little lysol I had with me washed the bowels in a warm solution, as well as I could, to get rid of the grit and filth of the floor that adhered to them, and, when moderately clean, returned them. I then picked up the peritoneum, twisted it, tied a piece of silk round it as close up as I could, cut off what remained below the silk, and returned it. I closed the wound with a continuous suture, including skin and muscle, after trimming the edges with a scissors, and put the calf into a not too clean house, as I thought, to die.

Next day I saw him, and he was quite happy, wearing a basket to keep him from eating his litter, and looking for his food. I, of course, thought it was only a question of time until the abominable filth would tell its tale.

I did not see him again for a week, when he was quite well, and the owner told me was never an hour unwell. The wound had quite healed, and did not suppurate. It was dressed with lysol and ac. boric He is a good 1½-years-old bullock now, and a good "doer."

Can aseptic surgery improve on this result? I do not recommend the method, though.

A FEW REMARKS ON THE TREATMENT OF "MILK FEVER."

BY E. A. RYAN, M.R.C.V.S., STROKESTOWN, CO. ROSCOMMON, IRELAND.

NOT knowing what is the actual cause of this disease, it is impossible to be definite when one asks oneself what is the actual curative agent in the present-day treatment.

After a considerable experience of this disease and its treatment for some years, I feel quite certain that intra-mammary pressure, either from air or fluid, plays a very potent part in the treatment. I am almost inclined to think that it alone is the essential part.

I have frequently treated cows for this disease, using nothing except air injections and massage of udder. The more air one puts in, the sooner the animal seems to get well. Have the udder as hard and tense as possible, and let it be well massaged, and the cow is usually up in a very short time. From the fact that the superficial blood-vessels, as a result of such treatment, show up very prominently on the surface of the gland, one would think that perhaps the pressure on the inside of the gland would alter the amount of blood there to such an extent as to very materially affect the excretory functions, and consequently the metabolic changes in the tissue, with its resultant amount of effete products returned to the blood. Perhaps this would help to explain the pressure action on the gland in the treatment.

CASE OF ANTHRAX IN AN OSTRICH.

BY W. ROBERTSON, M.R.C.V.S., F.R.S.E., DIRECTOR VETERINARY LABORATORY, GRAHAMSTOWN.

IT has been generally supposed that the ostrich, in common with the avian tribe, possessed an immunity (under natural conditions) to anthrax; this would appear not to be the case. The diseases of the ostrich under domestication are being studied at this laboratory, and the subject of this note was a full-grown hen bird (one of seven) in a wire-fenced kraal. These seven birds had been under observation for seven weeks; the kraal was a clean one, and no case of spontaneous anthrax has occurred in the station since its commencement, fourteen years ago. The birds were noticed to feed well in the morning, the ration being mealies and prickly-pear leaves, and were seen by the manager at mid-day. At 2.30 p.m. one was noticed to be lying on the ground quite dead, with the head and neck twisted back over the body. *Post mortem* examination was made at once. Blood was quite fluid, and the muscles twitched under the knife. The intestinal tract was almost empty (the crop being full) and congested from end to end. The mucous membrane was much congested, and covered with minute areas of hæmorrhage, and the lumen of the intestine contained a quantity of clear mucus streaked with blood. The spleen was much enlarged, soft, and dark in colour. Smears from the blood showed a pure culture of a bacillus identical, morphologically and in staining characteristics, with that of anthrax, and a slide was submitted to Sir John McFadyean, who corroborated this diagnosis.

(*Agricultural Journal of the Cape of Good Hope.*)

Abstracts and Reports.

A MEANS OF DISTINGUISHING GOAT'S MILK FROM COW'S MILK.

BY MAJOR W. H. HORROCKS, ROYAL ARMY MEDICAL CORPS.

AFTER I had isolated *Micrococcus melitensis* from goat's milk, specimens of cow's milk were frequently brought to the laboratory for examination as to adulteration with goat's milk. As cow's milk in Gibraltar costs far more than goat's milk, there is always a tendency for the milk vendor to add the latter to the former, and then sell the mixture as pure cow's milk. The fraud is very difficult to detect by physical or chemical examination, so I turned my attention to the lacto-sera in the hope that they might enable the adulteration to be detected in a few minutes.

Bordet[1] first showed that if a rabbit were injected intra-peritoneally with milk previously heated for one hour at 65° C., after a certain time a serum would be obtained having special properties in relation to the milk. He placed 3 cc. of the active serum in a test tube, and 3 cc. of normal serum obtained from different sources in a series of test-tubes, and then added ten to twelve drops of the milk to each tube. In the tube containing the active serum granules rapidly appeared, which increased in size, and formed thick flakes. Very soon the contents of the tube separated into two parts, one clear and the other containing agglomerated flakes. Sometimes the flakes descended to the bottom of the tube and the upper part cleared. This happened when the milk was poor in fat, or had been filtered two or three times through paper. If the milk were rich in fat the flakes were carried to the upper part of the tube through the agency of the fat globules enclosed in them. Under the microscope the mixtures of milk and active sera showed very numerous clumps of granules, which were not found in the mixtures of normal serum and milk. Wassermann and Schütze[2] injected rabbits subcutaneously with goat's, cow's, and ass's milk, and claimed that the active serum produced by each milk was specific, viz.: that each serum would only produce a præcipitum with the milk that had been used to prepare it. Schütze also stated that boiling milk interfered with the production of the specific reaction.

The following experiments were made with the object of confirming and extending these observations:—

TO DETERMINE THE SPECIFICITY OF LACTO-SERA GOAT'S MILK.

Experiment 1.—A rabbit was injected intra-peritoneally on May 2, 6, and 11, 1907, with goat's milk previously heated at 60° C. for half an hour. On May 15, 22, and 28, 10 cc. of milk were given, and on June 15 15 cc.; the rabbit receiving altogether 65 cc. of goat's milk. Blood was then removed from an auricular vein, and 3 cc. of the serum were placed in each of four small test-tubes. Goat's milk was now added to the first tube, cow's milk to the second, human milk to the third, and ass's milk to the fourth tube. As a control, a like amount

[1] "Le Mécanisme de l'Agglutination," *Annales de l'Institut Pasteur*, 1899, p. 225.

[2] "Neue Beiträge zur Kenntniss der Eiweissstoffe verschiedener Milcharten," *Verein f. innere Med.* Berlin, July 2, 1900.

of normal serum was placed in a fifth tube, and goat's milk was added to it. In half an hour the tube containing goat's milk and goat's serum showed granular masses surrounded by a clear fluid, and at the end of four hours most of the granular masses had floated to the surface, and the fluid in the tube was uniformly clear. The tubes containing the cow's milk, ass's milk, and human milk showed no change in half an hour; in four hours some of the fat floated to the surface, but the fluid below was uniformly opaque. The tube containing the goat's milk and normal serum was unchanged at the end of half an hour; in four hours, however, some of the fat floated to the surface, but the fluid below still remained thick and opaque.

The procedure above described necessitated the use of a considerable quantity of serum for each test. In order to economize the serum the following method was tried: The milk to be tested was diluted 1 in 5, with normal salt solution, and a portion was then drawn up in a capillary pipette, and the upper limit marked off. The diluted milk was next blown out into a watch-glass, and active serum was drawn to the mark on the pipette; the serum and diluted milk were then thoroughly mixed, and the resulting mixture was finally drawn up in the pipette and the end sealed off. As a control, the same procedure was followed with the diluted milk and normal rabbit serum. Some of the diluted milk was also drawn up in a capillary pipette and sealed off. Every endeavour was made to keep the columns of fluid in the control pipettes the same as in the pipettes containing the active serum. In the control pipettes no changes were seen, except that after a few hours some of the fat floated to the top of the tube; this was especially noticeable in the case of cow's milk. In the pipettes containing the active serum and goat's milk there appeared after about two minutes white flocculi, which gradually increased in size and density, the fluid between them becoming clear and transparent.

In addition to the pipettes, hanging drops were prepared with the mixtures of milk and active and normal sera. Under $\frac{1}{6}$ in. objective the mixture of normal serum and goat's milk showed a fluid containing fat globules evenly distributed throughout the preparation, but in the case of the mixture of goat's milk and active serum clumps of granules mixed with fat globules were noticed in about two minutes, and between the clumps the fluid was clear and transparent.

Experiments 2 and 3.—These were a repetition of Experiment 1, and similar results were obtained, the formation of flocculi in the capillary tubes containing the active serum and goat's milk being practically instantaneous. The serum of three rabbits was also diluted 1 in 5, and then mixed with an equal volume of goat's milk diluted 1 in 5. Nothing was seen in the capillary tubes for three hours, when fine flocculi appeared, and at the end of twenty-four hours thick, white masses, separated by clear fluid, were seen scattered through the tubes.

Experiment 4.—In the hope of preparing a serum which, when diluted 1 in 5, would act practically instantaneously, it was determined to inject larger quantities of milk, using the subcutaneous instead of the intra-peritoneal method. Accordingly 165 cc. of goat's milk were injected into a full-grown rabbit, 15 cc. being given on

September 19, 21, 23, 25, and 27, 1907, and 30 cc. on September 30, October 2 and 4. On October 7 the serum was tested by the capillary pipette and hanging drop methods, and practically an instantaneous reaction was obtained with the goat's milk when the serum was undiluted. It was noticed, however, that when the serum undiluted was added to diluted cow's milk, flocculi began to appear in the capillary tube after a short time, and in about two hours the appearance of the tube corresponded very closely to that of the pipette containing the goat's milk. Under $\frac{1}{2}$ in. objective, granular masses mixed with fat globules were seen in the mixture of both goat's milk and cow's milk with active serum, but in the case of the latter the clumps were distinctly smaller.

The active serum was then diluted 1 in 5, and mixed with equal volumes of goat's milk and cow's milk, the dilution of the serum in the pipette being in each case 1 in 10. At the end of five minutes flocculi were distinctly visible in the pipette containing the goat's milk, and under $\frac{1}{6}$ in. objective granular masses mixed with fat globules were seen scattered throughout the field. The tube containing the cow's milk remained uniformly opaque, but after some hours a layer of fat floated to the top of the tube, and when the fluid was examined in a hanging drop some grouping of the fat cells was observed, but no granular masses ever appeared.

This experiment seemed to indicate that when large quantities of goat's milk were injected the precipitating anti-serum produced acted as a group precipitant, and to distinguish between goat's milk and cow's milk it would be necessary to dilute the anti-serum.

Experiment 5.—In this experiment smaller quantities of goat's milk were injected subcutaneously, 10 cc. being given on February 3, 5, 7, 1908, and 15 cc. on February 10 and 13. The serum tested on February 16 was again found to precipitate both goat's milk and cow's milk; but on diluting it 1 in 10, as in the above experiment, a reaction did not appear in the pipette containing the cow's milk, and an examination of the contents in a hanging drop also proved negative.

Experiment 6.—This was a repetition of experiment 5, but a larger rabbit was taken and the injections were separated by longer intervals. The milk was heated at 60° C. for one hour and 10 cc. were injected on April 16 and 24, May 5, 8, and 13, 1908. The serum was examined on May 16, and found to react only with goat's milk.

In order to determine the length of time that the anti-bodies persisted in the serum, the lacto-sera obtained in the various experiments were placed in capillary pipettes and kept in the dark. The sera were examined weekly, and it was found that the reaction gradually became more and more feeble, requiring a longer time to produce a precipitate on each occasion. At the end of two months, as a rule, twenty-four hours were required to produce a complete reaction. Similar results were obtained with the sera removed at each test from the rabbits, which had received no further injections after the production of the anti-bodies.

The rabbit in Experiment 6, after the development of the specific reaction, received a weekly injection of 10 cc. of goat's milk. The result was not altogether satisfactory; in the third month after the commencement of the experiment the formation of precipitates was very irregular.

In order to obtain the best results, a fresh rabbit should be injected every month.

Cow's Milk.

Experiment 1.—Cow's milk, previously heated at 60° C. for half an hour, was injected as follows:—15 cc. on July 13, 17, 22, 26, and 31, August 3, 7, and 10, 1907; 120 cc. being given. On August 12 the serum was tested by the capillary tube method; clumps were seen in fifteen minutes in the tube containing cow's milk, but the goat's milk gave no reaction. On August 22 the serum was tested again, and clumps were formed practically at once with the cow's milk, the goat's milk again giving negative results.

Experiment 2.—In this experiment the heated milk was injected subcutaneously, 190 cc. being injected in twenty-two days. The injections were given as follows:—30 cc. on November 11 and 15, 25 cc. on November 20 and 22, 30 cc. on November 25, and 25 cc. on November 28 and December 2, 1907. The serum was tested on December 3, and an instantaneous reaction was obtained both in the capillary tube and hanging drop. No reaction was given with either goat's or human milk. The serum diluted 1 in 10 gave a slight reaction with cow's milk in the capillary tube after one hour, but no granular masses were observed in the hanging drop after twenty-four hours.

Experiment 3.—Only 140 cc. were injected, 20 cc. being given on the following dates:—December 13, 16, 20, 23, 27, 30, 1907, and January 2, 1908. Serum was taken on January 3, 1908, and tested with goat's, cow's, and human milk. As in the previous experiment, an instantaneous reaction was obtained with cow's milk in both the capillary tube and hanging drop. In the tube containing goat's milk a few clumps were seen, and after one hour granular masses were observed in the hanging drop. No reactions were seen in the pipette and hanging drop containing human milk. The serum was tested again on January 8, 1908, but no reaction with goat's milk was then obtained. Examinations made at later dates also proved negative as regards goat's milk.

Experiment 4.—In this experiment 60 cc. of milk were injected subcutaneously, 10 cc. being given on the following dates:—April 16, 24, May 1, 5, 8, and 13, 1908. The serum was tested on May 16, when a complete reaction was obtained with cow's milk at the end of two hours; but with goat's milk and ass's milk no reaction was observed even at the end of twenty-four hours.

Human Milk.

Human milk was obtained from a British subject born in Gibraltar, and a chemical analysis of it corresponded very closely with that given in most text-books. The chief characteristics were the large amount of milk sugar and the small quantity of proteids present. The milk was heated at 60° C. for half an hour, and 20 cc. were injected subcutaneously on the following dates:—December 11, 13, 16, 20, 23, 27, 30, 1907, and January 2, 1908. The serum was tested on January 3, when clumps were seen in the pipette containing human milk in about five minutes; in one hour the clumps were large, and the fluid in the tube was quite clear. Granular masses were not seen in the hanging

drop at first, but after one hour they were quite distinct. The pipettes containing goat's milk and cow's milk and the active serum, gave negative results even at the end of twenty-four hours.

Ass's Milk.

The milk was heated at 60° C. for half an hour on each occasion, and 10 cc. were injected subcutaneously on the following dates:—April 24, May 1, 5, 8, and 13, 1908. On May 16, 1908, the serum was examined by the pipette and hanging drop methods, the milk being diluted, 1 in 4, with normal salt solution. At the end of two hours precipitated masses were seen in the tube, the fluid being quite clear between them, and granular masses mixed with fat globules were observed in the hanging drop. No reaction was obtained with either goat's or cow's milk.

Conclusions—(1) It would appear that if goat's milk is injected into a rabbit in considerable quantities and at frequent intervals the lacto-serum obtained will precipitate the casein of cow's milk as well as that of goat's milk. Under these conditions it is necessary to dilute the lacto-serum 1 in 10, in order to demonstrate the specific reaction. (2) As a rule, when quantities not exceeding 10 cc. are injected either intra-peritoneally or subcutaneously at intervals of about seven days, the lacto-sera obtained are specific.

To Determine what Amount of Goat's Milk added to Cow's Milk can be Detected by the Lacto-Serum.

Equal parts of goat's and cow's milk were thoroughly mixed, and a dilution (1 in 4) of the mixture was then added to an equal volume of goat's lacto-serum. Precipitated masses were at once seen in the capillary tube, and granular masses were observed in a hanging drop.

One part of goat's milk was now added to three parts of cow's milk, and the mixture examined in a similar manner. Precipitated masses were seen in two hours, but the reaction was not perfectly complete: viz., the fluid was not quite transparent between the masses until the end of twenty-four hours.

One part of goat's milk added to nine of cow's milk, when tested with the lacto-serum, could only be detected after the lapse of twenty-four hours; the precipitated masses were then small, and the fluid remained opaque between them.

Practically, it is unlikely that the milk vendor will add less than one part of goat's milk to three parts of cow's milk, as smaller quantities would not pay him. Such an addition can be detected in two hours with an active goat's lacto-serum.

The Effect of Heat Applied to the Milk and the Anti-Serum.

Schütze stated that milk which had been boiled for half an hour lost the greater part of its power to form a precipitate on the addition of its specific lacto-serum. The goat's and cow's lacto-sera, which had been found to produce precipitates with the unboiled milks used to prepare them, were tested again with samples boiled down to half bulk, and precipitates were obtained both in the hanging drop and capillary tube.

A rabbit was next injected intra-peritoneally with goat's milk, which had been maintained at the boiling point for one hour. On each occasion 10 cc. were given, and the injections were made on June 11, 14, 19, 22, 24, and 28, 1907. The serum was tested on June 29, and found to produce an immediate precipitate with goat's milk heated at 60° C. for half an hour, and also when boiled down to half bulk.

It would therefore appear that boiling goat's milk does not interfere either with the production of a lacto-serum or with the formation of a precipitate by the specific lacto-serum. This point is of importance, as by law goat's milk cannot now be sold in Gibraltar unless it has been boiled.

The effect of heat on the lacto-serum was next investigated. The specific serum was drawn up in a sterile capillary pipette, and then maintained in a water-bath at a temperature of 60° C. for half an hour. After this treatment the serum was found to produce a precipitate indistinguishable from that given by the unheated serum. Heating this serum, however, at 65° C. for half an hour, or at 60° C. for two hours, destroyed its specific properties, no reaction being obtained even after twenty-four hours.

Conclusions.—(1) Boiling goat's milk for one hour does not interfere either with the production of a lacto-serum or with the formation of a precipitate by the specific serum. (2) Heating the lacto-serum at 60° C. for two hours or at 65° C. for half an hour destroys its specific properties.

(*Journal of the Royal Army Medical Corps.*)

STATISTICAL AND GENERAL REPORT OF THE ARMY VETERINARY SERVICE FOR 1907.

We have just received this report prepared by the Director-General of the Army Veterinary Service (General F. Smith). It is a most admirably prepared report, and furnishes much food for thought. We append an extract which will repay reading by anybody who has to do with the management of large numbers of horses, and especially that portion referring to feeding, a subject which General Smith has made particularly his own. The tables giving analyses of the conditions resulting in admissions to hospital are very instructive, but are too comprehensive to be introduced here.

The reports of the Principal Veterinary Officer of South Africa and the Senior Veterinary Officer of Egypt and a report on the working of the Army Vaccine Institute, Aldershot, are included.

The main report is an annual analysis of the wear and tear of the horses of the Army, and the tables are framed with the object of bringing out all points of practical interest.

The stock in horses is daily undergoing change; wastage and repair must remain in equilibrium, and are reciprocal. What we have to consider is wear and tear; these must be narrowly examined from every point, and, if excessive, the probable sources discovered and remedies suggested.

Horse management has within the last few years entered on a new

phase, viz., that of decentralization. Regiments and units are no longer in this matter arbitrarily controlled by one head, to the detriment of subordinate commanders, but liberty and independence of action are encouraged in order that officers may become educated in horsemastership; in effecting this desirable reform some mistakes are inevitable.

In the reaction which has followed the change in policy there is a tendency, as in all human reactions, for the pendulum to swing too violently in the other direction. Speaking broadly, there can be no doubt that even in the same regiment a very unequal standard of horsemastership now prevails; this is partly due to the fact that in horse management, as in everything else, some officers show greater aptitude than others.

The varying standard may also be due to other causes; there are some who regard the management of horses as a simple matter, for the reason, perhaps, that the rules governing it are by no means complex; but if this is the case, the simplicity of these rules is largely counterbalanced by the undoubted fact that the basis of horsemastership is prolonged experience, a something which no book can teach, and which no man can ever present to another.

To imagine that this matter were a simple one indicates ignorance of the subject, for the man of experience knows that his education, even at the end of an active life wholly devoted to a consideration of horses, is far from complete; how much more must this be with one in whom horsemastership forms but a portion of his military education, and is merely a means to an end.

This warning is especially necessary at the present time, for, as the tables attached to this report show, there is still great room for the prevention of disease and accident. In these matters we have not always made improvement, while in others, notably in sanitation, we have actually gone back.

Stable sanitation and the hygiene of the feet are, in my opinion, not so carefully considered to-day as they were twenty-five years ago, due largely to the ideas of stable management having undergone deterioration from the time the Continental system of bedding horses found advocates. The system, which was tried experimentally at Aldershot and other home stations some years ago, but was not generally approved of, consisted in not removing the bedding from beneath the horse, but adding dry material occasionally as the mass became too wet or soiled to lie on. The system had the merits of being labour-saving and cheap, but it cannot be conceded that these were sufficient compensations for employing a method obviously insanitary and destructive to the feet. The matter is alluded to here because the method has advocates in the Service, and is employed by a few unit commanders, to the detriment of the horses' feet and condition generally.

Feet should be kept clean and dry; this is an axiom in horsemastership as old as Xenophon. By the above described system of bedding the feet are kept wet and soft. The ammonia of the urine acts chemically on the horn, producing softening and consequent lameness. So irritating, indeed, is the moist surface of the bedding, that the skin in contact with its loses its hair and suffers from an eruption. Further evidence of a decline in horsemastership may be

seen in the shoeing of the present day, which has deteriorated in workmanship, while the feet between the shoeing processes do not receive all the care they need. This could be remedied in twelve months by unit commanders inspecting their shoeing, and horses' feet daily.

The figures in this report show that colic among army horses is on the increase. Colic is a disease very largely dependent on errors in feeding; any departure from what may be called the golden rules of feeding horses is sure to be followed by cases of the disease. Under centralized authority the proportion of colic in the army was 2·36 per cent.; these figures are based on ten years observation. Under the decentralized system of feeding the number of cases of colic have been steadily going up, and they are now nearly double what they were under the centralized system. Here are the recent figures: 1905, 3·37 per cent.; 1906, 3·79 per cent.; 1907, 4·35 per cent.

The cause of this increase must be sought in the numerous departures from common-sense feeding introduced in consequence of decentralization and an elastic system of forage supply. The excellent system of forage running account was intended to teach the art of feeding, a supremely important branch of horsemastership. Learning must always be associated with the making of mistakes, but there appears no reason why some of the mistakes made should not have been avoided, for example: (1) Underfeeding horses in the winter, with the object of producing a big reserve of food in the drill season. (2) Sudden changes in the nature and quantity of food. (3) The excessive use of proprietary foods, frequently of unknown composition, and of doubtful feeding value. (4) The use of boiled foods for an animal intended by its internal arrangements to digest uncooked grain. (5) The use of linseed (which is not a horse food) imperfectly prepared and frequently in excessive amounts. (6) The immoderate use of green forage, one of the most dangerous substances on to which a dry-fed horse can suddenly be brought. (7) The giving of green forage in an immature, fermented, or over-ripe condition. (8) The giving of large quantities of bran, under the impression that it was a nutritive substance; such have been some of the principal errors practised, and to these the increase in colic may be attributed. A normal proportion of colic, if we may so express it, we must expect, but the figures quoted show that the normal has been greatly exceeded, and for this there does not appear any excuse; expert advice is at the elbow of every unit commander, should he care to avail himself of it.

I have spoken of the above as colic, owing to the fact that recovery was in all cases complete, but the figures quoted above by no means cover the total amount of inefficiency caused by disorders of the digestive system. Of the horses of the army, 6½ per cent. were admitted for diseases of the digestive system during the year, and of these 103 died, or ½ per cent. of the average strength. These deaths cost not less than £4,000.

Deaths from diseases of the digestive system furnish the highest cause of mortality in the army. The time has, therefore, arrived when any further experimenting with foods and fancy dieting should be discountenanced. Plain, straightforward, simple feeding with articles of proved dietetic value, and a better distribution of the daily

ration into four "feeds," will bring the inefficiency from dietetic disease down to the normal. A careful enquiry is now being made into every case of colic, and the results will appear next year.

The Veterinary Service single-handed cannot influence the repression of disease and injury. The commanding officer is solely responsible for the preservation of health and the enforcement of preventive measures and sanitation among the horses committed to his care. In the prevention of disease and injury the unit commander is supreme; no steps, no matter how wise, can work effectively without his support and co-operation, and none can be introduced without his approval. It is necessary this point should be made clear, for the freedom of action thus accorded him brings with it its own responsibilities. The control of injury and disease lies as completely on the shoulders of the commanding officer as does the responsibility for the treatment of the injured or sick on the shoulders of the veterinary officer.

If the figures in these returns are to show any improvement, the only person who can bring it about is the unit commander. The field of prevention which awaits him is immense; from its absolute simplicity and common-sense character it may lack the attractive mysticism of disease, but the harvest is heavy, reapers only are wanted.

The report records the wear and tear of horses, and everywhere the influence of wounds and bruises on the efficiency of the army are evident. Kicks are the most important cause of wounds and contusions. Information is now being collected regarding every horse kicked, and the results will be presented in the next annual report. Kicking-mats hanging from the stable bails are inexpensive, and efficient protection against injury. It must be remembered that much of the inefficiency produced among horses under peace conditions is caused when they are lying idle, and not when they are at work. Speaking broadly, all our experience points to the fact that, if work is the cause of lameness, idleness is the cause of injury. The annual cost of broken legs, the great majority of which are caused by kicks from other horses, was probably not less than £3,600 for the year under review.

The underfeeding of horses in the winter has previously been mentioned; temptation to accumulate reserves of food by the process of semi-starvation must recoil on the head of its projectors. Horses in this debilitated condition are more liable to contract infectious and contagious diseases; further, when they are wanted for spring drills they are below par, impoverished, brush from weakness, and fall lame through want of condition. It requires to be more generally known that every week of semi-starvation to which horses are exposed will later on require a month for the purpose of effecting repair, and that some, indeed, may never recover. Such conditions are frequent enough during war, but are then inseparable from military service. The question at present seems to be: what restrictions should be placed on horse management without interfering unduly with the responsible officer, yet safeguarding the property of the public?

It may be said that, unless a short grain ration is employed during part of the year, no reserve can be formed for the drill season. This, however, is not the case; great savings may be effected in bedding without condemning horses to lie on their own excreta, while the possible saving in hay is considerable. Probably not less than 2 lb.

of hay a day are lost to most horses in the Service through getting mixed up with and soiled in the bedding.

An early morning inspection of the dung pit will reveal where savings can be effected without cutting the corn to starvation point.

It is not economical to sacrifice oats in order to buy linseed; all experience points to the fact that oats are essentially the best balanced grain for horses; linseed is excellent for cattle, but, excepting in small quantities, is impossible for horses, and can only be given when specially prepared. To these objections may be added the economical fact that linseed is twice the price of oats.

But even when the cost of alternative food is less than that of the standard ration, it may by no means be economical to employ it. For example, hay cost this year a little over £4 a ton, while a ton of carrots could be obtained for £2 12s. But the sacrifice of any considerable quantity of hay for carrots is not economical, as the latter, besides containing six times more water than hay, are also inferior in feeding value.

Similarly, the sacrifice of hay and corn for bran is another source of loss to be carefully watched. Bran is an admirable diet for the sick and for horses out of work (even if for only a day); its function is to maintain the contents of the bowels in a soft condition, and keep them acting. Horses at work do not need this, work stimulates the bowels, which begin to empty themselves almost as soon as the men have mounted in the morning. If evidence of this important statement be desired, it is furnished by the condition of the road travelled by a cavalry regiment on leaving barracks or camp. Owing to the perfect machinery now used in its production there is no flour left in bran, it is husk only, and possesses as much nourishment as sawdust.

It is attention to these points which is necessary to secure the utility of the running forage account system; it is, in fact, a lesson in practical economics.

A system of dealing with horses in the winter has within the last year or two come into existence in certain branches of the Service. It is known as "roughing up," and consists in throwing a certain number of horses out of work, either in their own stable or on farms, and letting them lie idle during the winter. The rest is beneficial, but the system by which it is secured is pregnant with possible trouble. If the horses are on farms it is safe to say they are being underfed. If in stables ungroomed and on the "Continental system" of bedding, they will contract skin disease and bad feet. There appears to be no authority for this method of dealing with troop horses during the winter, and unless edged in by restrictions, nothing but harm will result. The boarding-out system will sooner or later lead to the introduction of glanders.

Report on the Army Vaccine Institute, Aldershot.

Reported by the Veterinary Officer in Charge.

During the year sufficient vaccine for 111,924 persons has been issued:—

Army	Home Stations	68,059
	Foreign	4,435
Royal Navy		39,430

The total quantity supplied since the opening of the Institute is 1,529,420.

RESULTS OF VACCINATIONS. AS SHOWN BY RETURNS DURING THE YEAR.

	Primary						Re-vaccination			Totals
	Infants			Others						
	P.	M.	F.	P.	M.	F.	P.	M.	F.	
Army { Home	3,402	198	176	2,374	224	67	37,982	14,134	*4,755	63,312
Army { Foreign	118	16	21	210	72	14	179	240	153	1,023
Royal Navy ...	27	4	1	4	—	—	1,491	1,492	664	3,683
Totals ...	3,547	218	198	2,588	296	81	39,652	15,866	5,572	68,018

* Of these, 3.830 are reported on the returns as showing good marks of previous vaccination.

PERCENTAGE OF SUCCESSFUL VACCINATIONS.

	Army		Royal Navy
	Home	Foreign	
Primary { Infants	95·33	86·87	96·87
Primary { Others	97·44	95·27	100·0
Re-vaccinations	91·63	73·25	81·78

WORKING EXPENSES.

	£	s.	d.
Thirty-six calves	83	8	0
Rations for calves...	9	19	7½
Fuel { coal	4	2	6
Fuel { coke	1	18	1½
Fuel { wood	0	4	3
Light—paraffin oil and candles	0	10	11
Instruments and apparatus	6	5	1
Consumable stores and working materials	33	8	4
Coir fibre for bedding for calves...	0	14	4
Cleaning allowance	9	3	0
	£149	14	2

General Remarks.

Thirty-six calves were vaccinated during the year, the average cost being £2 6s. 4d.

Thirty-five calves have been slaughtered and found healthy on *post-mortem* examination; one sold alive, no lymph having been collected

The cost of rations for calves shows a considerable increase over last year. This is due to a delay in slaughtering and disposing of the carcases, the calves have consequently been kept for a longer time after vaccination.

An attempt was made at the beginning of last year to obtain heifer calves only, but this was found to be impracticable owing to their scarcity. The majority of calves used are bulls.

During the year chloroformed lymph only has been issued both to home and foreign stations. The results obtained in Mediterranean stations are uniformly good. Special enquiries are being made as to the efficiency of this chloroformed lymph in the Tropics.

Trials have been made of different materials for bedding calves when under vaccination. Coir fibre has been found to have special advantages; it can be sterilized, it does not adhere to the vaccinated area to any extent, and the lymph is more free from the hay bacillus.

The subordinate staff remains unchanged, and their work has been carried out in a most satisfactory manner.

Reviews.

OUTLINES OF CLINICAL DIAGNOSTICS OF THE INTERNAL DISEASES OF THE DOMESTICATED ANIMALS. By Professor Dr. Bernard Malkmus, of the Royal Veterinary College of Hanover, Germany. Translated by David S. White, Dean of the College of Veterinary Medicine, Ohio State University, and Dr. Paul Fischer, State Veterinarian of Ohio. Published by Alex Eger, Chicago. Price, 15s. net.

The need for a useful book on diagnostics is undoubted, and it is felt both by the veterinary student and the practitioner of veterinary medicine. The little work under consideration represents an endeavour to fill the blank. It is concise, nicely arranged, and provides plenty of material for consideration, but still leaves much room for improvement. One can scarcely avoid coming to the conclusion that the author, in his attempt to omit nothing likely to be of service in the determination of the seat of disease, has erred on the side of including methods which, in some cases, appear almost impracticable.

The term "diagnosis" is used only to cover the determination of the nature of internal disease; this, we think, unnecessarily cramps the meaning of the word.

We do not agree with the author when he classes pregnancy among the causes of *abnormal* distension of the abdomen.

In the paragraph relating to the gastro-intestinal parasites of ruminants no mention is made of either of the following: *Strongylus cervicornis*, *S. gracilis*, and *S. convolutus*, or the unnamed species of strongylus discovered by McFadyean.

We do not consider that the plan of collecting a horse's urine in a vessel secured to his sheath is a very practical one. In cases where a doubt exists as to whether a male bovine passes urine, it is advised that a cloth be suspended at the entrance to the sheath. Such a procedure is usually unnecessary, for if the animal has recently micturated the long hairs at the end of the sheath will be found quite moist.

The removal of the submaxillary glands of the horse for the purpose of diagnosing glanders is, we think, unlikely to be often resorted to.

Striking the inferior patellar ligaments in order to get tendon reflexes is not of much service in the lower animals, and it would certainly be unsafe to try it on many horses.

The work, on the whole, bears traces of the expenditure of considerable labour in its preparation, and no one can fail to benefit by reading it. Fifteen shillings, however, is rather too high a price.—M. J.

Intossicazioni Alimentari da Carne (Meat or Flesh and Food Poisoning) e Relation Profilassi. By Dousenico Gualducci, Bologna.

Gualducci has produced a comprehensive survey of the poisoning of human beings by tainted meat products, and the different ways that this mishap declares itself. The matter of bad meat from the horse, cow, sheep, goat, pig, and rabbit is fully discussed, and diseased wild animal flesh, bird, fish, crab and mussel-poisoning are well considered.

The flesh of fevered and hunted animals, and of those suffering from infectious illnesses, is touched on. Putrid food and meat that changes from different causes or becomes injurious is written about. Animal parasites, and chemical poisons are discussed in the last chapter. A special chapter is devoted to the meat from animals suffering from rabies, anthrax, toxæmia, malignant œdema, purpura, catarrhal fever of cattle, glanders, tuberculosis, foot and mouth disease, tetanus, septicæmia.

The nervous and gastro-intestinal symptoms of ptomaine poisoning are not overlooked. Toxæmia from the flesh of particular animals, and preparations made from them is written about, and meat poisoning in the domesticated animals is described.

Measures to stop meat poisoning are advocated, such as obligatory inspection of all meat, rigid cleanliness in the treatment of flesh, removal of confiscated goods, meat transport, slaughter utensils and their cleanliness, preservation and preparation of nutriments, additions to sausages and pastes. Agglutination in the diagnosis of meat affections is estimated at its important value.

The book is eminently readable to all those who understand the Italian language. It is a valuable contribution to literature, and of service in all places where hygiene and knowledge of nourishing material for human beings is a civilized desire.

Translations.

A NEW CHLOROFORM MASK FOR THE HORSE.

BY PROFESSOR A. W. MÖRKEBURG.

THE chloroform apparatus shown in the figure is of metal, and encloses the upper lip and part of the cheek of the horse. Its anterior upper part is vaulted, so that air space is present between it and the horse's nostrils. In the wall of this vault are three ventilators, the middle one opening inwards, and the other two outwards. On the outside of the one ventilator is a moveable tube, in which gauze or a

A new chloroform muzzle.

sponge soaked in chloroform may be placed. The ventilation temple is formed by isinglass-stone, Muscovy glass or mica, which is very durable, and the ventilators are of the same kind, only larger than those used in ether masks for human beings. Straps go over the head of the horse and round the underjaw. The mask is big enough for any horse, but when not completely closed a handcloth may be tucked round it at the top.

Narcosis may be produced by a drop flask once the gauze has been moistened with chloroform. It can be slowly produced, and the

violent movements at the beginning of narcosis lessened. Irritation is avoided, and chloroform economized. The operator can always hear the movement of air in the temple, and can notice whether the breathing is regular or not.

(*Deutsche Tierärztliche Wochenschrift.*)

SOME CASES FROM RUSSIAN JOURNALS.

Treatment of Articular Wounds.

A colt, aged 2, was sent to the author because of a swelling situated outside the left leg above the hock. From the swelling there was a discharge of coagulated blood, and the wound was treated on antiseptic lines. Some days later, a new hæmatoma appeared in the neighbourhood of the stifle; it was opened under good conditions without the articulation being implicated; suppuration was not great, and the temperature did not exceed 38·8° C.

Three days later, the wound gave exit to synovial liquid. Injections of 1 in 10,000 sublimate solution and iodoform ether powder 1 in 20 were employed. Suppuration was never great; injections of 1 in 10,000 silver nitrate were then used, and cure was rapid.

The author accorded preference to iodoform ether in the following circumstances: A horse, aged 5, had a wound of the left hind pastern discharging much synovial fluid. This wound had been made by the pin of a pole, and was done in a moment. After powdering with iodoform ether, the wound was covered with an antiseptic dressing. On the following day there was no lameness and no discharge. The wound was covered with iodoform collodion, and the animal sent away 15 kilometres, quite cured.

Ante-partum Paralysis.

This accident is rare, and worthy of record. A cow, aged 4, had shown post-partum paralysis the previous year, and got up three or four hours after the udder had been insufflated with air. The following year, six or seven days before calving time, she commenced to give about ten to twelve bottles of milk, after which she fell ill suddenly, but showed no preparatory disturbance.

Called in to examine her, the author found all the symptoms of paralysis. Temperature fell to 36° C.; bloody fæcal matter of solid consistence filled the rectum; udder very full of milk. On the day she fell ill her udder was injected with air at 4 o'clock, and the following morning she got up. During the day she improved; she ate some hay, and her temperature rose to 38·5° C. She received Glauber's salts to help defæcation. Three days after the paralysis the cow was delivered of a live calf. Injections containing Glauber's salts which were given had no bad effect on parturition.

Eczema of the Lips.

Eczema is found in the calf, the colt, the sheep, and the fowl; it affects the neighbourhood of the lips.

Symptoms.—Tumefaction, redness and pain in the lips, which are

covered with pustules. These pustules burst after a little time, and form dry scabs. Fissures result, which make prehension difficult. The young animals become exhausted.

Prognosis is only grave if it extends much in young animals and causes exhaustion.

Treatment consists in applying vaseline ointments, warm, carbolized and soapy lotions, or one of the following preparations :—

(1)	Liquid tar	10·0
	Creosote	5·0
	Glycerin pur.	25·0
(2)	Balsam of Peru	20·0
	Spirit of wine	10·0
	Oil of hartshorn	5·0
(3)	Ceruse pomminade	35·0
	Crystallized acid. carbol.	5·0
	Acid. tannic.	5·0
	Oil of sesame	40·0
(4)	Zinci. oxid.	10·0
	Creolin...	8·0
	Vaseline, liquid	35·0

Before employing either remedy, it is well to wash the parts with potassium permanganate solution 2 per cent. Sick animals should be the objects of careful hygiene.

(*Le Bulletin Vétérinaire.*)

[In this affection in sheep the translator has found internal medication, such as solution of hyposulphite of soda, also useful.]—G. M.

New Instruments.

THE "CUST" ROPE RELEASE HOBBLE.

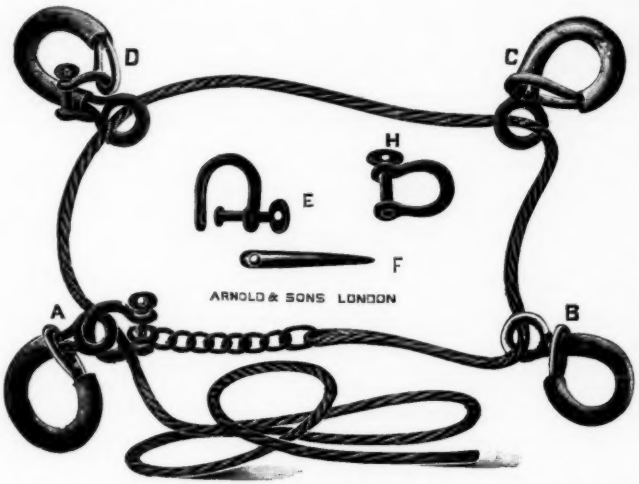
(Protected.)

These hobbles combine the portability of an ordinary rope hobble with the convenience of the heavier release leather hobbles.

They are exceedingly strong, only the very best manilla rope subjected to Government tests being employed in their manufacture. They are very simple to use, cannot get out of order, can be carried on a bicycle or saddle, can be sent by parcel post (their weight being only 9 lb.), and practical experience during severe tests in the past few years shows them to fulfil a long-felt want, viz., the convenience of being able to release any leg whilst operating, combined with portability and adaptability ; for they can be used on any sized animal from a donkey to a draught horse. They are very durable, all parts liable to chafe being well protected. Briefly described, they consist of four rubber-covered rope loops, and a long rope with about 14 in. of chain at the end. The horse is on the ground before the chain comes into the hobbles at all, thus the noise of the chain rattling through the hobble rings is done away with.

Detachable Shackles.—These are provided with each set, and can be used at will, either to release a leg or to make the hobbles fit a

larger pastern, or they need not be used at all, except in the above cases. Any hobbles can be used as the main hobble, and any hobble can be used on any leg.



Their price, 2½ guineas, places them within the reach of all. Messrs. Arnold and Sons, of West Smithfield, London, are the sole agents.

Correspondence.

To the Editors of the VETERINARY JOURNAL.

SIR,—In your December number I find a paper by J. A. Murray, M.D., which was read before the National Veterinary Association, on "Cancer in the Domesticated Animals." It is a very interesting one, but where did he get his information that the cow was kept for draught purposes in Ireland? Some of my American friends have joked me about it. I know the statement is not correct.

Yours truly,

RICHARD EBBITT, M.R.C.V.S.

Grand Island, Nebraska,
December 23, 1908.

THE PREVALENCE OF SWINE FEVER.

To the Editors of the VETERINARY JOURNAL.

SIR,—In his letter under the above heading published in a recent issue of the *Times*, Sir William Collins states that the present precautions employed against swine fever are not conspicuously successful. The figures which he quotes afford ample corroboration of this

assertion, while the continued prevalence of the disease is in great measure explained by the attitude of the Board as revealed in Sir William's quotation of the reply from that authority to a question recently put by him.

In July last a question by Colonel Hall Walker as to the efficiency of the system of disinfection employed by the Board in the case of glanders received a reply very similar in tenor to that recently given to Sir William Collins, Sir Edward Strachey stating that the Board's system was quite satisfactory and that nothing was to be gained by a change of method.

It has repeatedly been brought to notice of the Board that the disinfectants used by them—viz., a 1 per cent. solution of chloride of lime containing not less than 30 per cent. of available chlorine and a 5 per cent. (*minimum*) solution of carbolic acid (containing not less than 95 per cent. of actual carbolic acid)—are totally unreliable.

Swine fever is a highly infectious disease, and without the thorough disinfection of all premises with which infected animals have come in contact it is never likely to be stamped out. I do not of course contend that even the most efficient system of disinfection is in itself all sufficient; but I assert that without it the eradication of the disease is an absolutely hopeless undertaking, and that accordingly, the Board of Agriculture should take immediate steps to ascertain whether their system of disinfection is the best possible, and if it be not, to replace it by more efficient methods.

I am, Sir,
Your obedient servant,
M.D.

Books and Periodicals, &c., Received.

Journal of the Royal Army Medical Corps; Report of the Army Veterinary Service; London University Gazette; Board of Agriculture and Fisheries; Department of Agriculture and Technical Instruction for Ireland; Agricultural Journal of the Cape of Good Hope; Intossicazioni Alimentari da Carna (by Dousenico Gualducci, Bologna); Sleeping Sickness Bureau.

Letters and Communications, &c.

E. A. Ryan; J. Martin Rice; Professor J. F. Craig; G. Sutton; Messrs. Arnold and Sons; G. Mayall, M.D.; R. Ebbitt.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements), should be addressed to the Editors.

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Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.